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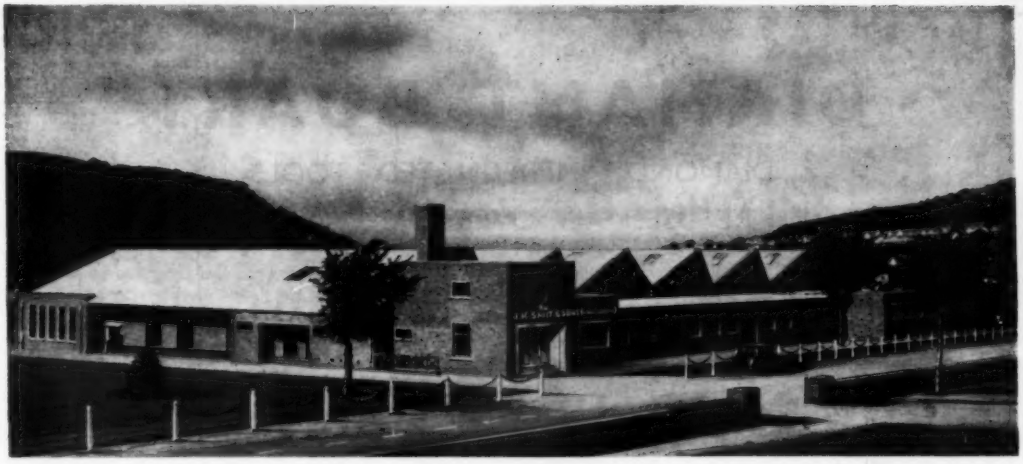

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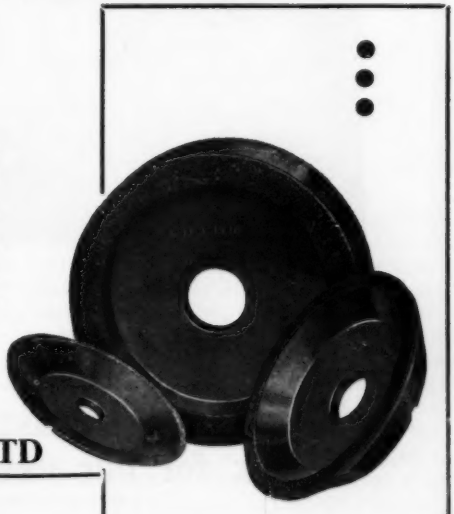

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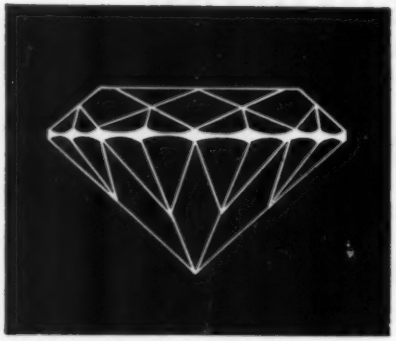

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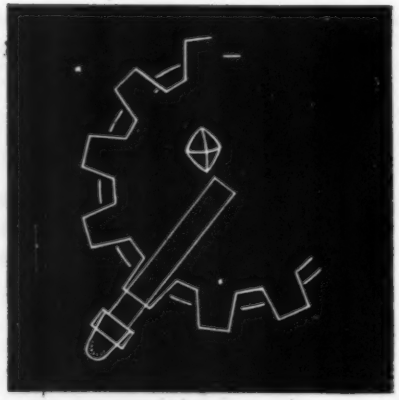

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PRINCIPAL CONTENTS

Generally Speaking — **Adamant** 185

Regular Phenomena of The Structure of Grinding Wheels as Chipping Tools — **Dr-Ing. J. Peklenik** 186

Dressing Thin Grinding Wheels — **John Waller** 196

A New Type of Radius Dresser for Grinding Wheels — **John Waller** 198

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Generally Speaking

Industrial diamonds and automation

It is becoming increasingly difficult to talk about the machine tool industry without mentioning automation. The emphasis was, until recently, concentrated on increasing the efficiency and production capacity of individual machines; now it is more concerned with eliminating as far as possible the human element. The stimulus for this has been provided to a large extent by the increased cost and scarcity of labour. Technical progress has also been a less obvious but equally important stimulus. Not only must machines incorporate the operators' skill; in many cases far more than human skill is required. No operator can consistently reproduce components with tolerances judged to millionths of an inch.

Automation then means higher production, greater precision, and reduced labour costs. Machine tools are not only expected to do more but to do it better and more accurately. The materials from which machine tools are made therefore are of the greatest importance if they are to be equal to these demands. Hardness and long working life are, more than ever, prerequisites for cutting edges and grinding surfaces and for just these qualities one automatically turns to natural diamonds.

Natural diamonds of course vary in quality, and performance will vary accordingly. This is perhaps best illustrated by the new diamond grit developed at the Diamond Research Laboratory, Johannesburg. This new grit has been found stronger than any grit available to date and in tests with concrete, marble, and tile it permitted a 30 to 50 per cent faster cutting rate. The increasing demands of modern industry make it doubly important to ensure that the correct type of diamond is used and, equally important, that it is used correctly. In this way better performance and longer life can be achieved with a corresponding saving in cost.

ADAMANT.

Regular Phenomena of The Structure of Grinding Wheels as Chipping Tools

Report from the "Laboratorium fuer Werkzeugmaschinen und Betriebslehre der TH Aachen."

by Dr-Ing. J. Peklenik

Research into the structure of grinding wheels was carried out with regard to the dimensions and shape of particles and bond bridges. Accurate technical measurement of the particle dimensions was necessary for the work. The volumetric equation for the grinding wheel was worked out from the known quantitative data concerning the particle and bond constituents in the grinding wheel. The values for the bridge lengths and cross cuts were calculated. A value—the bond equivalent—was defined for the limit of the possible combinations in the production of grinding wheels.

SYMBOLS

$\bar{d}_{k1}$	=	Average value of max. measurement of particles	mm, µm
$\bar{d}_{k2}$	=	" " " min. " " "	" "
d_{k1}	=	max. dimension of particle	mm, µm
d_{k2}	=	min. " " "	" "
F_b	=	cross section of bond bridge per particle	sq mm
F_k	=	surface of particle	sq mm
K	=	volumetric constants of grinding wheel	
K_v	=	V_{ko}/F_k = particle constants	cu mm/sq mm
l_b	=	lengths of bond bridges	µm, mm
n_k	=	number of particles per Pond	particles/Pond
N_h	=	hardness scale (N_h = 1 to 19)	
N_s	=	texture scale (N_s = 0 to 12)	
s_{k1}	=	deviation of max. measurement of particles	mm
s_{k2}	=	deviation of min. measurement of particles	"
V_b	=	bond constituent	%
V_{bk}	=	constituent of bond per particle	cu mm
V_k	=	volumetric constituent of particle	%
V_{ke}	=	volume of individual particle	cu mm
V_{ko}	=	particle constituent of the texture scale $N_s = O$	%
V_p	=	pore constituent	%
Z	=	number of particles per volume unit	particles/cu cm
Z_1	=	" " " length unit	particles/cm
γ	=	specific weight	p/cu cm
φ_h	=	scale grade of hardness	
φ_s	=	" " " texture	
λ_k	=	actual distance between particles	mm
$\xi = \frac{\bar{d}_{k1}}{\bar{d}_{k2}}$	=	ratio of max and min dimension of particles	

Introduction

Little is known about the regular phenomena of the structure of the grinding wheel as a chipping tool. The reasons for this can be found in the multiplicity of the structural elements and their numerous possible combinations, and also in the fact that the producers of grinding wheels do not make known their recipes for different types of wheel. This naturally renders more difficult the task of ascertaining theoretically the regular phenomena in the structure of grinding wheels and thus their elastic properties.

In the numerous studies of the problem of grinding the question of the structure, the form of the cut in truing, and the hardness and elasticity characteristics of grinding wheels have been given too little consideration. With regard to the properties of grinding wheels used, the specifications given by the manufacturers should be read; but they are subject to certain limitations.

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For example, the hardness of the grinding wheels of the same specifications but produced by two different factories will not be exactly alike. The tool is therefore an almost unknown factor in the study of different problems. For this reason, it is difficult to give for practical application well-founded experimental results which will have universal validity, and which will coincide with practical results.

In order to fulfil the requirements, some methods for objective testing of hardness properties and the behaviour of the grinding wheel during work have been developed (9). In the present work some regular phenomena of structure are examined, which are responsible for the physical-mechanical properties, the cutting depth, and the wear behaviour of the grinding wheel. The experiments concern ceramic-bonded grinding wheels. For some examples the numeric calculations have been worked out to give formulae. In connection with this it must be stressed that the results can vary according to the original components of the volumetric equation, which the individual producers have made the basis of their composition.

The calculation of the regular structural phenomena of grinding wheels should extend the present mostly qualitative works and lead to the existence of a hardness scale with a physical basis. The considerations should be regarded as a first attempt to achieve an objective picture of the structure of grinding wheels.

Experiments on the measurement of particle size and particle shapes

The exact knowledge of the measurements and shapes of abrasive particles is one of the most essential pre-requisites in the examination of the structure of grinding wheels. The abrasive particles, as is shown in the later experiments, can be exactly measured for their dimensions. On the other hand in order to determine the dimensions of bond bridges one must turn to photographs — probabilities — which cannot be verified by experiment with present methods of measuring. As the bond bridge measurements are most probably correlative with the particle sizes, an exact technical measurement of the particle size is of great importance.

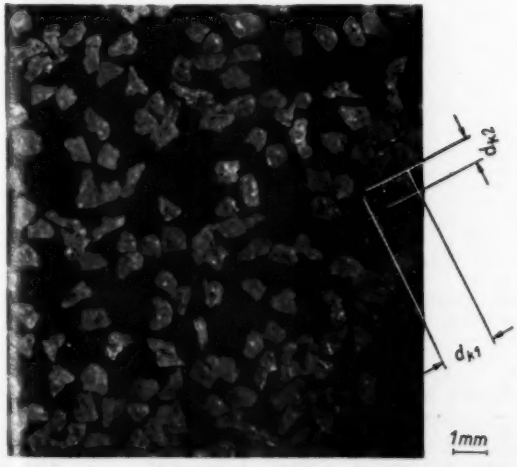


Fig 1. Measurements and shapes of abrasive particles (Electro-corundum 36).

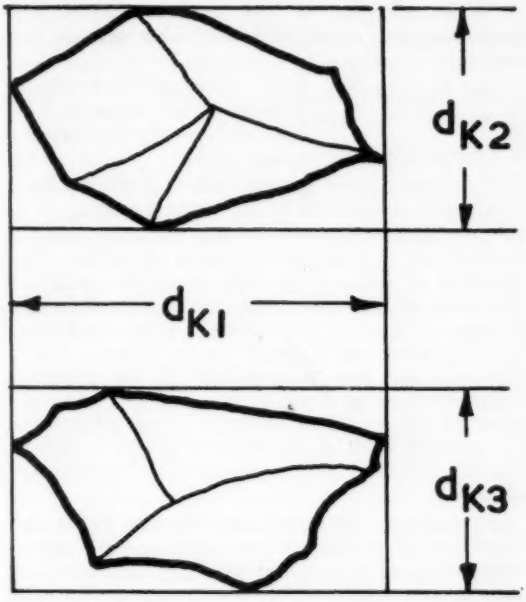


Fig 2. Characteristic measurements of abrasive particles.

The irregular shapes of abrasive particles occur in the breaking down of polycrystals. A regular geometrical particle shape is hardly ever seen, for abrasive particles in the form of monocrystals seldom occur.

In Fig 1 precious corundum particles of grain-size 36 are shown. From this it may be seen that their dimensions and their shape are very varied and irregular. According to E.N. Maslov (4) particles can be in the form of an octahedron, a tetrahedron, a triangular prism, etc. They are most frequently found in more or less octahedron form.

As characteristic dimensions of the abrasive particle, the size of the smallest side of the rectangle drawn round the particle is given. In Fig 2 the measurements of the rectangle are indicated as $d_{k1} \times d_{k2} \times d_{k3}$.

With reference to the particle shapes, the particles can be divided into four groups (2), namely:

1 $d_{k1} : d_{k2} : d_{k3} \approx 1 : 1 : 1$ — isometric or normal;
2 $\approx 1 : 1 : 0.33$ — disk-shaped;
3 $\approx 1 : 0.33 : 0.33$ — needle-shaped;
4 combinations of forms 1 to 3.

This grouping is fairly rough and gives only a qualitative judgement of the particle shape.

The determination of the particle size is carried out in practice by means of sieves. The number of meshes per unit of surface and the diameter of the wire determine the particle size in sieve analysis. The standard sieves and their particle sizes are assumed to be known. It is obvious that the dimensions of the particles with the figures, e.g., 16, 36, 60, 150, etc., are very variable in this basically rough estimation of particle size. Sieve analysis does, however, answer practical requirements to a satisfactory degree.

If, however, greater demands are made for precision of measurements, sieve analysis is too imprecise, as it is impossible to determine its degree of error. The microscope measuring technique suggested by L. T. Work (11) makes it possible to determine more exactly the particle dimensions and their statistical grouping. The experiments reach a high degree of accuracy.

In the present experiments the grouping of the particle measurements was determined in a similar way. The abrasive particles are photographed and fixed on the measuring screen at a certain magnification (Fig 1). With a particle size analyser the statistical values were recorded. The largest and smallest measurements (d_{k1} and d_{k2}) were measured and evaluated on the flat for each individual particle. This method has, however, the disadvantage that in an evaluation of particle volume in one plane the third dimension d_{k3} cannot be determined. The comparison of measurement d_{k2} with the mesh width for the particle in question shows that for the particle examined one can say $d_{k3} \approx d_{k2}$. The measurement of the third particle dimension would be very difficult and take a long time in experiment, for the measurement must take place in the position in which the particle was during the photographing.

In two series of experiments rare corundum and silicon carbide particles and normal corundum particles as SN-particles (mixed particles)

TABLE 1

Particle measurements and their deviations for different grain sizes (normal particles) and cutting materials.

Particle number	Cutting material	Measurement range of the particles (standardised)		Measured particle measurements				$\bar{d}_k = \frac{\bar{d}_{k1} + \bar{d}_{k2}}{2}$ (mm)	$\xi = \frac{\bar{d}_{k1}}{\bar{d}_{k2}}$
				Average		Deviations			
		d_{km1} to d_{km2} (mm)	Average $\bar{d}_{kn}$ (mm)	$\bar{d}_{k1}$ (mm)	$\bar{d}_{k2}$ (mm)	s_{k1} (mm)	s_{k2} (mm)		
8	SiC	2.8 — 2.3	2.550	3.674	2.122	0.63	0.366	2.898	1.73
10	SiC	2.3 — 2.0	2.150	3.145	1.739	0.443	0.292	2.442	1.83
12	SiC	2.0 — 1.7	1.850	2.704	1.561	0.393	0.27	2.132	1.73
16	SiC	1.4 — 1.20	1.300	2.095	1.173	0.35	0.19	1.634	1.79
24	EK	0.85 — 0.70	0.777	1.410	0.784	0.272	0.147	1.097	1.80
	SiC			1.251	0.670	0.21	0.136	0.960	1.87
36	EK	0.60 — 0.50	0.550	1.116	0.504	0.193	0.103	0.810	2.30
	SiC			0.971	0.478	0.158	0.088	0.724	2.02
46	EK	0.42 — 0.355	0.387	0.649	0.306	0.134	0.066	0.477	2.12
	SiC			0.703	0.373	0.151	0.071	0.538	1.89
60	EK	0.30 — 0.25	0.275	0.518	0.228	0.117	0.051	0.373	2.28
80	EK	0.21 — 0.18	0.195	0.456	0.185	0.109	0.042	0.320	2.06
	SiC			0.395	0.193	0.08	0.044	0.294	2.28

TABLE 2

Particle measurements and their deviations for different particle sizes (usual graduation of grain sizes)

Grain number	Measured range of the particles (standardised) $d_{k n_1}$ to $d_{k n_2}$ (mm)	Average $\bar{d}_{kn}$ (mm)	Measured particle measurements: Average $\bar{d}_{k1}$ (mm)	Average $\bar{d}_{k2}$ (m)m	Deviations s_{k1} (mm)	Deviations s_{k2} (mm)	$\frac{\bar{d}_{k1} + \bar{d}_{k2}}{2}$ (mm)	$\xi = \frac{\bar{d}_{k1}}{\bar{d}_{k2}}$	Particle volume V_{ke} (mm³)	Particle surfaces F_k (mm²)	Particle constants. $K_v = \frac{V_{ke}}{F_k} \cdot 10^{-2}$ $\left(\frac{mm^3}{mm^2}\right)$
10	2.30 — 2.00	2.150	3.908	1.842	0.762	0.395	2.875	2.12	4.22	14.9	28.3
16	1.40 — 1.20	1.300	2.354	1.149	0.48	0.252	1.751	2.05	1.02	5.8	17.6
20	1.00 — 0.85	0.925	1.994	0.961	0.43	0.206	1.447	2.07	0.596	4.05	14.7
24	0.85 — 0.70	0.777	1.450	0.660	0.307	0.147	1.055	2.20	0.193	1.92	10.05
36	0.60 — 0.50	0.550	1.110	0.470	0.233	0.106	0.790	2.34	0.069	0.98	7.05
46	0.42 — 0.355	0.387	0.780	0.340	0.170	0.079	0.560	2.29	0.0265	0.51	5.2
60	0.30 — 0.25	0.275	0.526	0.240	0.100	0.053	0.383	1.19	0.00925	0.254	3.64
80	0.21 — 0.18	0.195	0.42	0.180	0.091	0.0415	0.300	2.23	0.00390	0.1425	2.74
100	0.15 — 0.125	0.137	0.27	0.110	0.063	0.030	0.190	2.45	0.00087	0.0533	1.63
120	0.125 — 0.105	0.115	0.21	0.086	0.056	0.0265	0.148	2.44	0.00043	0.0326	1.35
150	0.085 — 0.075	0.080	0.12	0.082	0.050	0.027	0.101	1.46	0.00037	0.0295	1.25

were examined in this way. Table I shows the results of measurements in experiments on rare corundum and SiC particles of different grain-sizes (nominal particle). The average values and the deviations for d_{k1} and d_{k2} were calculated from $\sim$ 2000 measurements. In order to form comparisons with the standard measurements for the present grain-sizes these are given also.

The average value of the largest particle measurement $\bar{d}_{k1}$ are above the maximal standard measurement found in all cases, but the average value $\bar{d}_{k2}$ is right at the bottom of the lowest limit of given tolerances. The ratio ξ of the average value of the highest and the lowest measurement varies in the grain-sizes observed between

$$\xi = \frac{\bar{d}_{k1}}{\bar{d}_{k2}} = 1.73 \text{ and } 2.46 \qquad (1)$$

The diversity of measurements show that the variations of the values for d_{k1} and d_{k2} are great. The diversity of the smaller measurement d_{k2} is especially important, lying within the standard range of the sieve for the grain-sizes in question. So, for example, the smallest measurement in grain-size EK 36 can vary from d_{k2} max. = 0.956 to d_{k2} min. = 0.22 mm.

For the standard particle these variations are great. The experiments showed that in spite of comparatively high sieve accuracy of ±5% (3) great variations in the particle size appear in sieving. This has considerable effects on the structure and properties of the grinding wheel.

In a further series of experiments different grain-sizes put together, as they are in the grinding wheel, were examined. Table II shows the measuring results evaluated. The deviations are in this case greater which is due to the varying types of particle size in the individual grain-sizes. The ratio ξ varies here also around the value 2. This signifies that in most cases in the initial approximation there are particle shapes which correspond roughly to the octahedron.

The average volume of particles which are of octahedron form, can be expressed by the formula:

$$V_{ke} \approx 0.67\, \bar{d}_{k2}^3 \qquad (2)$$

and their surface F_k by:

$$F_k \approx 4.4\, \bar{d}_{k2}^2 \qquad (3)$$

These two values are of interest in further experiments. Table II contains the numerical results for the corresponding grain-sizes.

By means of frequency analysis of the different grain-sizes it is possible to indicate the distribution of standard particle constituents in the individual standard grain-sizes.

In Fig 3 and Fig 4 the distributions of values d_{k1} and d_{k2} for various grain-sizes and combinations are given above the standard grain-sizes. From this it is seen that the actual particle sizes of a standard grain-size, e.g. SiC 10, go far beyond the standard range in the measurement d_{k1}.

Thus the measurements d_{k1} for SiC 10 extend beyond the range of grain numbers 8 to 5; the d_{k2} values, however, lie within the range of grain-sizes 18 to 8. With mixed grain-sizes this excess is even greater.

With the indicated frequency analysis of the individual grain-sizes the distribution of the

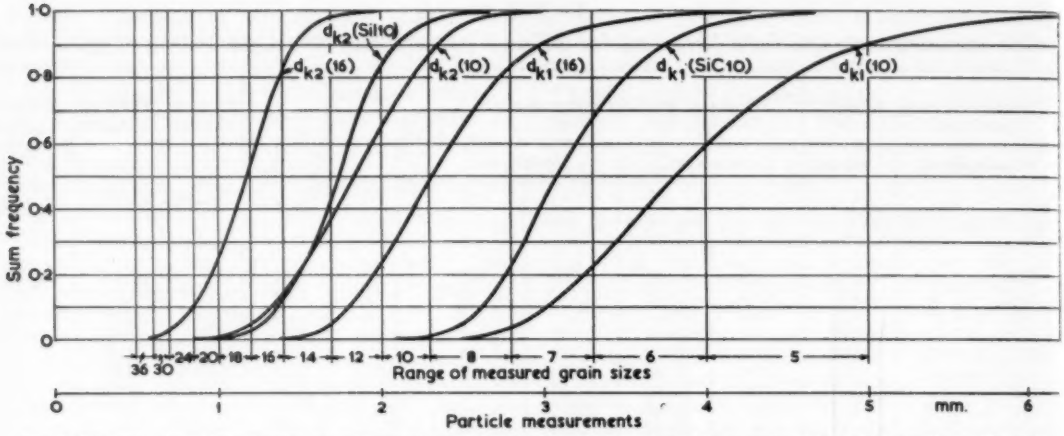
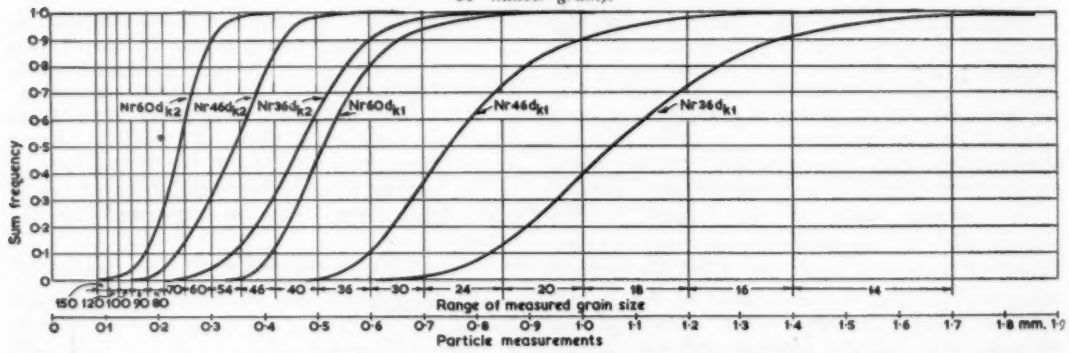


Fig 3 (above). Sum frequencies of measured particle size in relation to standard grain-sizes. (Standard particle SiC 10, mixed particle NK 10 and NK 16).

Fig 4 (below). Sum frequencies of measured particle size in relation to standard grain-sizes. (NK 36, NK 46, NK 60 mixed grain).



individual particle numbers in the type of particle examined can be accurately determined. These facts are of interest for practical evaluation in the workshop. E. N. Maslov (4) gave a few details on the volumetric particle constituents in the collected grain-sizes. The facts are limited, however, to the grain-sizes determined by sieve analysis. A comparison of this result and those obtained from the frequency analysis is shown in Fig 5. The variations in dimensional values of the distributions are essential. The advantage of the evaluation with the particle size analyser is seen in that one can thereby obtain an accurate view of the particle measurements and their distribution.

Examination of the particle and bond constituents in grinding wheels

Every grinding wheel is determined in its structure and physical-mechanical properties by the particle measurements and the volumetric bond and particle constituents. If the volume of the grinding wheel is 100%, the following equation can be formed:

$$V_k + V_b + V_p = 100\%^* \qquad (4)$$

The volumetric composition of a grinding wheel is dependent on the ingredients and the conditions of manufacture and differs for every type of wheel. The volumetric particle constituent depends on the number of particles and the size of particles, and can thus be the same for wheels of different grain size.

The hardness grades of grinding wheels are conditioned by the amount of the bond constituent V_b. They are indicated in accordance with the Norton scale with the letters E to Z and divided up qualitatively in accordance with DIN 68100 as follows (see Table III).

This qualitative indication of the hardness grades by letters has been put to practical tests.

* The % sign is omitted from the following remarks; but the statements are basically founded on volumetric percentages.

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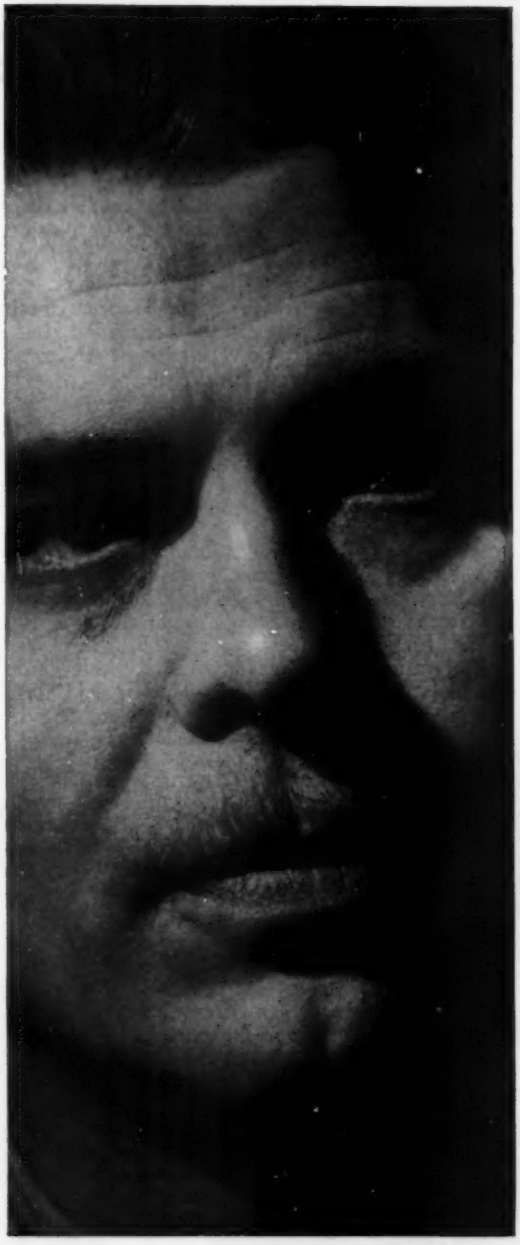

"We get more jobs out of each wheel with these" says **Tom Swain**

Tom Swain is the charge-hand of the cutter-grinding shop of Jonas & Colver (Tools) Limited. Most of the tools they grind there go to the motor industry or the aircraft industry. Among the most successful production tools that Tom's men use are the resin-bonded diamond wheels made by CARBORUNDUM shown in our smaller illustration. 'We find we get more jobs out of each wheel with these.' Tom says, 'And that's important with diamond wheels. Diamonds cost money!' He might have added that long wheel-life saves time spent in wheel changing, and so increases the production rate — not a big increase, but worth something in the course of a year.

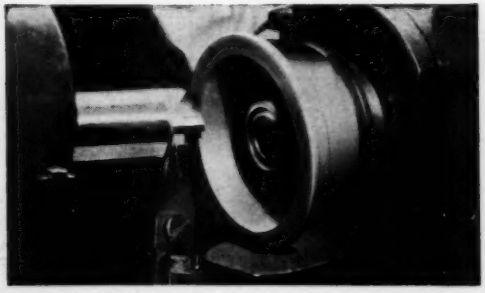

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TABLE 3

Qualitative indication of the hardness grades on the Norton scale.

Very soft	Soft	Medium hard	Hard	Very hard	Extremely hard
E	H	L	P	T	X
F	I	M	Q	U	Y
G	J	N	R	V	Z
	K	O	S	W	

For the analytical examination of the correlative connections between the structure of the grinding wheel and its properties this method of qualification is useless, however. More recent experiments on hardness support this statement (8). For this reason a suggestion has been made that the hardness grades be indicated with figures 1 to 19 instead of letters E to W (Table IV).

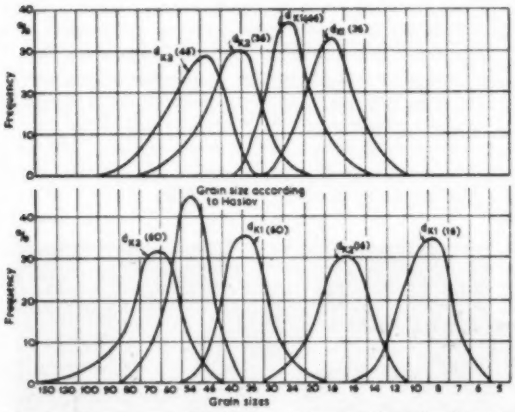


Fig 5. Frequency distribution of actual grain-sizes in relation to standard grain sizes.

The very hardest grinding wheels X, Y, Z, are not considered, as they are hardly ever used. All hardnesses which come outside this limit are regarded as special cases.

The scale of the hardness grades can be observed in the bond constituents V_b from E = 1 to W = 19, fundamentally, according to various systems. The scale grade φ_h should be observed as a parameter, which provides the increase of the volumetric bond constituent for each adjacent hardness grade. This means that each adjacent hardness grade must point to a greater percentage of bond and a smaller of pore volume. The scale grades should be chosen in such a way that the individual hardness grades differ considerably one from another.

Some quantitative results have been obtained (2, 6) from which it can be concluded that the grading of the bond constituent follows an arithmetical progression. In the present experiments this progression has been chosen for the grading. It is quite possible that other progressions could also be used in certain cases. With reference to the grading, Equation 4 for the adjacent hardness grade can be written as follows:

$$V_k + (V_b + \varphi_h) + (V_p - \varphi_h) = 100 \qquad (5)$$

The value of the scale grade φ_h can vary from factory to factory. G. Pahlitzsch (7) gives for sintered grinding wheels a scale grade $\varphi_h = 0.4$ and for cast wheels $\varphi_h = 0.8$, while V. N. Ljubomudrov (2) gives a standard scale grade in Russia of $\varphi_h = 1.5$. This value depends on the ingredients and production conditions (e.g. pressure, baking temperature, etc.) in the individual factory. As can be seen in Equation 5, the volumetric constituent of the grain-size does not change with the hardness grade.

A futher characteristic value of the grinding wheel is its texture. By simultaneous variation of the particle and bond constituents the different textures are obtained. In DIN 69100 the texture is classified so that the closest texture is indicated by 0 and the loosest by 10. E. N. Maslov gives the loosest texture as 12.

The highly porous grinding wheels are indicated with high figures or with special letters.

One texture grade is shown in contrast with another of a closer texture by the fact that the particle constituent decreases by a certain percentage, while the bond constituent increases by the same amount.

TABLE 4

	Very soft			Soft				Medium hard				Hard				Very hard			
Norton grading ...	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
New grading	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

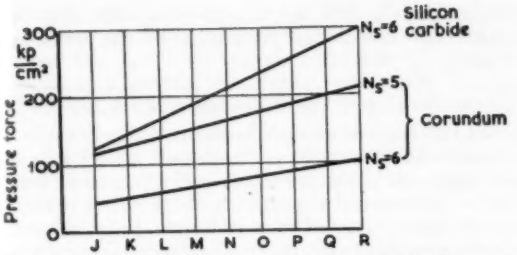


Fig 6. Relationship of pressure force to the hardness of texture of the grinding wheel (after Ljubomudrov).

Equation 4 can be written in this case as follows:

$$(V_k - \varphi_s) + (V_b + \varphi_s) + V_p = 100 \qquad (6)$$

The texture grading is, according to the known quantitative facts, arithmetical (2, 4). The scale grade is determined and gives $\varphi_s = 2$. The prerequisite for an analytical study of the problem is fulfilled for the texture grades N_s are not qualified by letters, as are for example the Norton hardness symbols, but by figures, thus: $N_s = 0$ to 12.

To produce different textures several possible combinations exist. So it is quite conceivable that, in order to obtain a closer texture of the grinding wheel, one should change the particle and bond constituent by the scale grade and at the same time increase the pressure correspondingly.

Few facts are known which show the ratio of pressure and structure, hardness and particle size. In Fig 6 and Fig 7 some of the relationships of these factors are shown (2). From this it is seen that with increasing hardness value N_h and particle size, as with lesser texture values N_s, the pressure during sintering must be greater. No rule can be formed on the basis of the foregoing facts. The increased sintering pressures in harder and coarse grained grinding wheels are

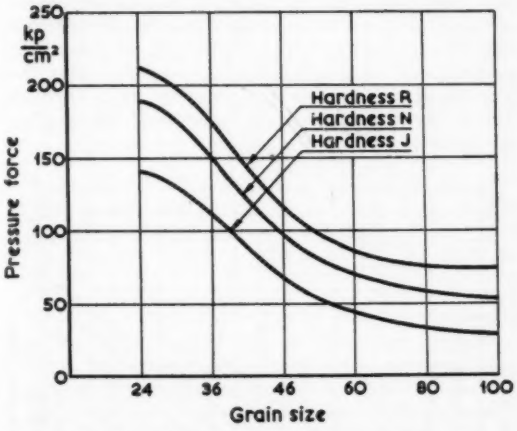
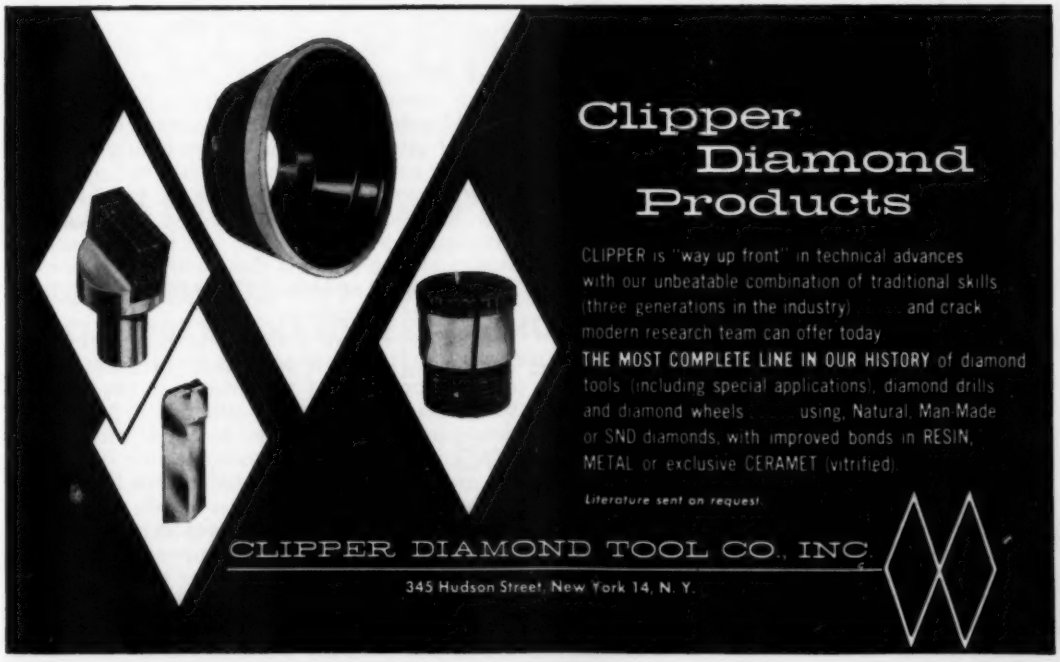


Fig 7. Relationship of pressure force to the grain-size and hardness of grinding wheel (after Ljubomudrov).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determined by the strain phenomena caused by the sintering. The greater bond volume in harder grinding wheels requires greater pressures in order to obtain the specific sintering per volume unit of the bond.

Deduction of the volumetric grinding wheel equation

It is evident from the above explanations, in accordance with which points of view the individual hardness and texture grades are built. It appears that the particle constituent V_k and the pore constituent V_p in the grinding wheel depend on one value only, that is the particle constituent on the texture grade N_s and the pore constituent on the hardness grade N_h. For this reason it is advisable to express as a formula bond constituents which vary with the texture or hardness. From Equation 4 we have:

$$V_b = 100 - V_k - V_p \qquad (7)$$

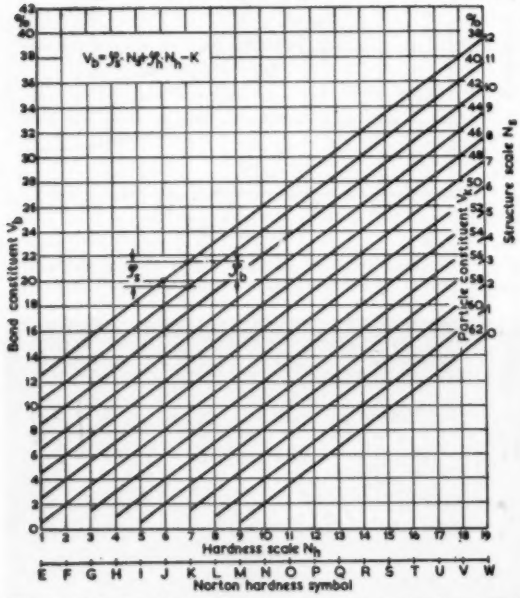
Bond constituent V_b
Particle constituent V_k
Structure scale N_s
Hardness scale N_h
Norton hardness symbol
E F G H I J K L M N O P Q R S T U V W

Fig 8. Relationship of bond constituent to hardness and texture grade of the grinding wheel (volumetric constituents).

With respect to the scale grades φ_s and φ_h and also the scale numbers for hardness N_h and texture N_s (see Table 4) the following expression is obtained from Equation 4 in the arithmetic progression of the bond and particle constituent:

$$V_b = 100 - (V_{ko} - \varphi_s N_s) - (V_{po} - \varphi_h N_h). \qquad (8)$$

The boundary conditions obtained from the volumetric particle and pore constituents V_{ko} and V_{po} should be regarded as constants. The universal expression for the volumetric grinding wheel equation is as follows:

$$V_b = \varphi_s N_s + \varphi_h N_h - K, \qquad (9)$$

where $K = 100 - V_{ko} - V_{po}$ signifies the universal volumetric constants of the grinding wheel.

Discussion of volumetric grinding wheel equation

In the explanation of Equation 9 the boundary conditions must be considered in order to estimate the constants K. The texture scale $N_s = O$ forms the starting point for the particle constituent V_{ko}, and the hardness scale $N_h = 1$ (Hardness E) for the pore constituent V_{po}.

According to various texts [2, 4, 6] a particle volume $V_{ko} = 62$ corresponds to the texture scale $N_s = O$ and a pore volume of $V_{p1} = 49.5$ to the hardness scale $N_h = 1$. As, however, the hardness scale N_h begins not with zero but with 1 (hardness E according to Norton) it is important for reasons of technical calculation (see Equation 8) to formulate the pore volume $V_{p1} = V_{p1} + \varphi_h = 51$. From these numerical data the volumetric constant K can be calculated as follows:

$$K = 100 - V_{ko} - V_{p1} = 13 \qquad (10)$$

The volumetric grinding wheel equation (9) can then be written in relation to Equation 10 thus:

$$V_b = \varphi_s N_s + \varphi_h N_h - 13. \qquad (11)$$

As was pointed out earlier, the scale grade $\varphi_s = 2$ is given unanimously by all writers (2, 4, 6). For the hardness scales, however, various scale grades are given, namely $\varphi_h = 1.5$; 0.4; 0.8. On the question of the size of scale grades the following must be noted: the scale grades φ_s and φ_h must be chosen in such a way that the hardness scales of the grinding wheel and its texture from grade to grade are clearly distinguishable. This is the basic requirement which arises from the new definition of grinding wheel hardness (8). The examination of the hardness of grinding wheels shows clearly that two adjacent hardness grades can only be regarded as different if the average value of the bond strength and its deviations are regarded as essentially different from each other, i.e. the difference is statistically certain. If this condition is not fulfilled nothing can be said about the different hardness grades or texture.

It is not known how the scale grades φ_h are determined for the individual hardness grades of the comparative test pieces at the grinding wheel manufacturers. Neither is it possible to determine with the works to hand, whether the scale grade φ_h was so chosen that the hardnesses are quite clearly distinguishable with the present methods of measuring (blast depth, number of percussions etc). In hardness experiments on some grinding wheels it appeared that this condition was fulfilled (8). There are other experimental results, however, in which the hardness grade used was such that the differences of the

average values of the bond strength from one hardness grade to the next could only be casually observed. Let it be said that the size of the scale grade φ_h depends, of course, essentially on the quality and composition of the bond.

The suggested symbolization of the hardness grades N_h by means of the figures $N_h = 1$ to 19 (instead of letters E to W) gains its physical meaning through the volumetric grinding wheel equation (9). In the calculation of the bond constituent V_b the corresponding hardness symbols can be inserted and thus Equation 9 can be resolved simply. In setting up the physical hardness scale, which is defined by the bond strength, this type of symbol has proved correct and important (8). Thus two grounds for the usefulness of a new system of symbols of hardness have been produced, to justify this suggestion.

The texture grade N_s has already been established with figures between $N_s = 0$ and 12 and they can be usefully inserted in Equation 9.

The classification of the grinding wheel with regard to its texture and the physical-mechanical properties in accordance with this proposal could read as follows, e.g.: Grinding wheel grain-size 36, hardness K, texture 7 = 36-7-7*.

The distinction between the traditional and the proposed system of classification consists only in the statistical information obtained from the hardness grade. Thus the above-mentioned advantages are obtained.

In further quantitative experiments the scale grades for the structure $\varphi_s = 2$ and for the hardness $\varphi_h = 1.5$ are taken in accordance with the proposal made by V. N. Ljubomudrov. The statistical data therefore apply only in this case. But basically the same considerations and calculations can also be made with other values.

The volumetric Equation 9 for grinding wheels with the above scale grades reads:

$$V_b = 2N_s + 1.5N_h - 13 \qquad (12)$$

In Fig 8 the results of calculations according to Equation 12 are graphically presented. The texture N_s was chosen as parameter.

The following should be said on the divergences of the volumetric constituents of particles V_k and of bond V_b. For a fixed recipe these constituents should vary very little, as the measurement of the weight is made with extreme accuracy. The wide deviations in the distribution of the bond constituent on the individual particles are, however, due to great variations in the particle dimensions within the grain-size. These questions are examined more closely in further observations.

To be concluded.

* No indication is given of the type of bond and other statistics.

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Dressing Thin Grinding Wheels

by

John Waller

Despite the use of thin rubber wheels in engineering workshops, there are many occasions when it becomes necessary to dress the standard type of grinding wheel to a very thin section to perform some particular operation. Though the former wheel is admirable for most jobs, an attempt at a deep slot in a hardened steel die raised the problem of overcoming a slightly tapered slot. A variation of only 0.002 in. occurred in the width from top to bottom, but this was enough to render the die useless for its purpose. The alternative of trying a usual standard wheel raised the problem of how to dress the wheel to the necessary degree of thickness.

Attempts to dress each side, until the required thickness was reached, eventually caused the wheel to fracture. The difficulty appeared insurmountable until it was decided to try grinding both sides simultaneously using a twin head diamond holder.

The drawing shows how this was achieved:— A steel base (A) is shaped to provide a generous clearance for the wheel. Two holes directly opposite each other were bored to receive the diamond holders (B and C). They are clamped by the screws (D) to ensure that no movement occurs as the wheel is progressed across the diamonds. An adjusting screw (E) completes the details of this equipment; a look at the drawing will reveal that only a single adjusting member is included in the design. One holder merely fits the base and no provision is made for pushing this item forward in the direction of the wheel face.

As both faces of the wheel must be dressed together, it follows that the diamonds must move inwards. Failure to carry out this setting every time a cut is taken causes deflection of the thin sectioned wheel which may fracture immediately the cut is tried. Apparently this would mean one adjusting screw would have to be at the rear of the wheel and therefore difficult to reach every time a slight movement was essential. However only one diamond actually moves in and the compensating adjustment is made with the aid of the machine slide. This means that a movement of 0.004 in. of the diamond by the adjusting screw is halved by moving the machine cross slide a distance of 0.002 in. in the opposite direction, an adjustment that enables the diamonds to remove 0.002 in. from each surface. Incidently this is about the maximum these thin wheels can stand and the most efficient mode of operating, when a wheel reaches a width of approximately 0.09 in., is to reduce the figure to 0.001 in. per surface or less.

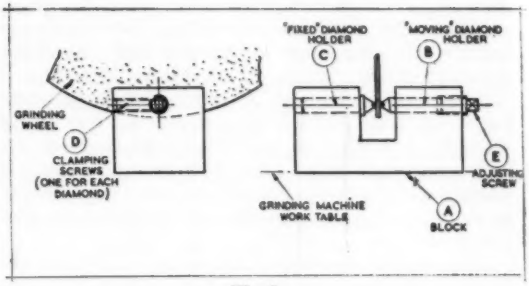

Fig 1.

While this attachment was initially designed to deal with narrow wheels, it has been found that wheels are dressed perfectly accurately when they are considerably above the dimension mentioned; in fact for wheels up to ¼ in. thick this simple gadget is superior to the single diamond type holder.

Manchester Venue for 8th Factory Equipment Exhibition

The Factory Equipment Exhibition was this year held at Belle Vue, Manchester, for the first time since its inception. The display, which ran from September 21st to October 1st, was Manchester's biggest-ever industrial exhibition with more than 230 manufacturers represented. The choice of a provincial city as the venue for a national exhibition of this nature is vindicated—if vindication be needed—by the fact that within 100 miles of Manchester there lies over 50% of Britain's manufacturing industry.

Owing to the plethora of items on show this year, exhibits were grouped into sections so that visitors could conveniently assess developments in any particular category of equipment. The

categories were as follows: Building, Insulation; Heating, Power, Ventilation, Air-conditioning, Dust and Fume Extraction; Handling, Packing, Partitioning, Storage, Business Machines, Drawing Office Equipment; Workshop Machines, Tools; General Industrial Equipment; Instruments, Electronic Devices; Product Finishing, Anti-corrosive treatments; Safety, Canteen, Welfare; Protective Clothing; Cleaning, Maintenance.

The 1960 Factory Equipment Exhibition was sponsored by the Manchester Chamber of Commerce, *The Financial Times*, and *Industrial Equipment News*, and organised by Industrial and Trade Fairs Limited. The 1961 Exhibition is scheduled for November 13th to 18th at Earls Court, London.

News in Brief

The Diamond Corporation (Sierra Leone) Ltd. is reported to have reached an agreement with the Sierra Leone Government under which the corporation will prospect for platinum and gold as well as investigate what diamond reserves still exist in the disused swamps and terrace gravels outside the Sierra Leone Selection Trust lease areas. The Corporation will help the Government's Mining and Geological Departments in prospecting work in various parts of Sierra Leone, and will be allowed to mine platinum and gold if reserves are found to be economically workable. It will not, however, be permitted to mine diamonds. Diamonds, if recovered during prospecting or in subsequent exploitation, will be sold through the Government Diamond Office. Proceeds of sales will be refunded to the Corporation to the extent of their expenses.

Mrs. Margaret McGinnis, Executive Manager of the Industrial Diamond Association of America, addressed the weekly meeting of the West Milford Rotary Club at the Motel Bingler.

The Rotarians were told of the formation and general operations of the association which is made up of diamond importers, dealers, and manufacturers of rough diamond tools. It co-operates with the government in setting up standards, guards against false advertisements within the industry, and publishes diamond statistics. She presented a film depicting the extensive diamond mining operations and work required to supply the world's diamond needs. She pointed out that 80% of the precious stones are used industrially and the remaining 20% adorn the women of the world.

Concluded on page 199

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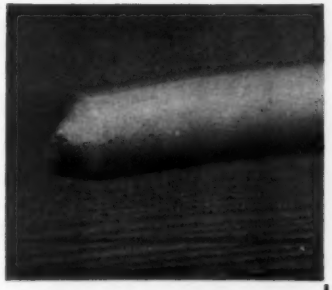

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A New Type of Radius Dresser for Grinding Wheels

by

John Waller

One of the most frequent and by no means the easiest pre-dressing operation is the formation of a radius on a grinding wheel in order to reproduce the profile on a component. Though all the attachments designed for this type of work use the swinging diamond holder motion, they are often cumbersome to use and, even more important, setting the diamond to achieve the required radius is a slow job; also the result of this work is occasionally problematic and the only way to determine that a correct radius has been achieved on a grinding wheel is to check the ground component.

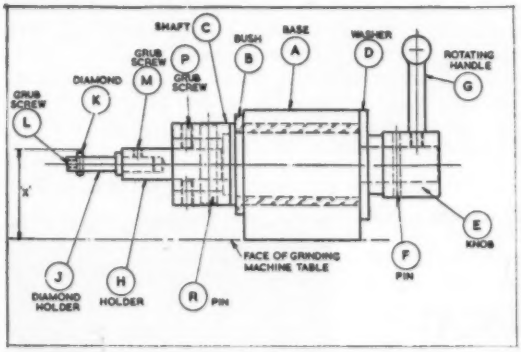

Fig 1.

Fig 1 illustrates a comparatively simple yet effective wheel dresser which, though still using a rotary motion for making the necessary curve on a wheel, is easy to operate and has a degree of adjustment not generally associated with equipment as small as this. Finally it will grind both the concave and convex curves to an accuracy limited only by the operator's ability.

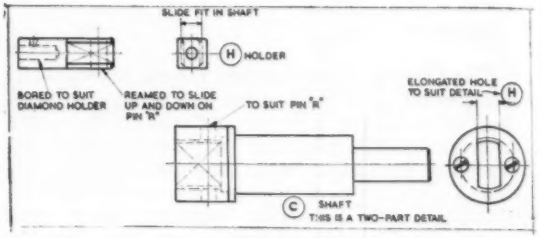

Fig 2.

A steel block (A) is bored to receive the bush (B)—the latter can be either phosphor bronze or a hardened steel detail, accurately lapped to suit the shaft machined on (A). A further shaft (C) assembles in the bush and is held in position by the washer and knob (DandE). This shaft is a two part detail, as Fig 2 indicates, because the front portion is slotted to receive the holder (H) and the shape makes this proceedure necessary. This latter holder has a pair of flats milled to match the slotted hole in the shaft and, by including a substantial pin (R), the holder can slide up and down without turning. The final detail is the diamond holder (J). The length of this part is arbitrary but if it is made too long, there is a risk of deflection occurring and causing an incorrect radius.

The following procedure is observed each time the diamond is set. The first point to remember is that the distance of the centre line of the shaft (C) from the base of the equipment

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is a known figure. The dimension is best made a known even figure according to the size of work it will eventually undertake and such figures as 1.500, 2.000, and 2.500 are obvious choices. The boring of this hole to a tolerance of ± 0.0002 in. is not difficult to achieve. It thus becomes apparent that the checking of the "X" dimension shown on the drawing is essential and, if the previously mentioned known dimension is subtracted from it, it will indicate the distance

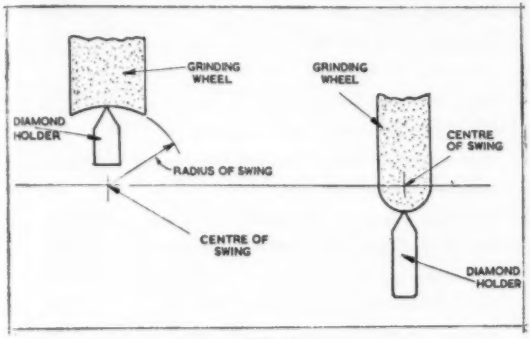

Fig 3.

from the centre of the shaft to the diamond. A subsequent rotation of the diamond will accurately reproduce a concave radius on the wheel. The checking of dimension "X" is carried out with the aid of a dial indicator, and a careful movement back and forth of the shaft will give a setting of the diamond as close as 0.0005 in.

Any adjustment is made by slackening off one grubscrew (P) and tightening the other, depending on which direction it is necessary to move the holder (H); the latter can not fall out of the shaft (C) as long as the pin (R) holds it in position, but the shape allows the holder to slide up and down when the grubscrews are altered.

A convex radius is obtained by lowering the diamond until the centre is below the centre of the hole in the block. The drawing in Fig 3 is slightly out of scale in an endeavour to show the diamond clearly and the latter is therefore drawn oversize. When the holder (H) is lowered in the shaft (C) sufficiently, the diamond drops below the centre and will produce the radius opposite to that accomplished when it is above centre. The line across the drawing indicates the height of the shaft from the base of the block. In one case the diamond is well above this point and gives the concave shape to the wheel and, in the other, the diamond is shown in a much lower position where it produces the convex radius.

An advantage of this type of diamond dresser is the simplicity of construction which brings it within the scope of every workshop; only basic operations are needed in its manufacture. Whether or not heat treatment of one or two parts is deemed essential is a matter of opinion, but perhaps the holder (H) would benefit from this treatment as there is the risk wear will occur owing to the continual loading of the diamond holder; also the grubscrews will eventually damage a soft surface as the various adjustments are made. An important factor to bear in mind when designing a holder of this nature is the size of work the grinder must perform. There is nothing to be gained by attempting to make the equipment cover too large a range as this will lead to a bulkiness which the design is intended to avoid.

News in Brief (concluded)

It was reported from Sierra Leone that digging had ceased following the rains, but in some areas large quantities of gravel are still to be washed. This results from the present policy of digger licence holders, concentrating on extracting as much gravel as possible during the dry season and leaving the washing of gravel until the digging has to stop on account of the rains.

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ADVERTISERS' INDEX

	Page
Carborundum Co. Ltd.	191
Clipper Diamond Tool Co. Inc.	193
Compentrad Ltd.	195
Diamant Boart	182
Diamond News, The	200
Drukker, D. & Zn. N.V.	184
Endecotts (Filters) Ltd	199
Habit Diamond Tooling Ltd.	Cover III
Henderson Diamond Tool Company, Ltd., The	198
Impregnated Diamond Products Ltd. ...	Cover IV
Indusmond (Diamond Tools) Ltd	183
Industrial Diamond Co. (Sales) Ltd. ...	Cover II
Smit, J. K. & Sons (Diamond Tools) Ltd. ...	181
Triefus & Co. Ltd.	Cover I
Vacuum Research Corporation	197
Wolverhampton Diamond Die & Tool Co. Ltd.	183

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INDUSTRIAL DIAMOND ABSTRACTS

Industrial Diamond Information Bureau,
2 Charterhouse Street, London, EC 1.
Telephone : FLEet Street 1577

1960 Volume 17
OCTOBER

DIAMOND MINING AND INDUSTRY

Alluvial diamond returns for April 1960

Anon. *Diamond News* 1960 Vol 23 (10) pp 33-34 (July)

Rough and uncut diamond production in April 1960 for Cape Province : 6,518.75 ct of total value £64,310 (197s 4d per ct) ; Private Estates : 172.50 ct of total value £2,883 (334s 3d per ct) ; Transvaal Province : 17,473.75 ct of total value £64,621 (73s 11d per ct). Thus, total production amounted to : 24,165.00 ct of total value £131,814 (109s 1d per ct).

M *Ebe F.13.361*

Tanganyika diamond exports

Anon. *Diamond News* 1960 Vol 23 (10) p 34 (July)

Exports for May 1960 : 40,618 ct of total value £294,490 (145s 0d per ct). Total exports for Jan to May 1960 : 178,336 ct of total value £1,531,408 (171s 9d per ct). Corresponding exports for May 1959 : 27,872 ct of total value £233,198 (167s 4d per ct). Total exports for Jan to May 1959 : 120,118 ct of total value £970,475 (158s 9d per ct). *M* *F.13.364*

Sales of gem diamonds at their zenith

Anon. *Diamond News* 1960 Vol 23 (10) pp 3-4 (July)

Comments on the heavy and sustained demand for gem diamonds mentioning also the trends in industrial diamond sales. It is concluded that there is no reason to expect other than an increase in the demand for the latter. *D* *F.251*

£17,213,163 gem sales create another record

Anon. *Diamond News* 1960 Vol 23 (10) pp 6-7 (July)

Gives quarterly sales figures for gem and industrial diamonds from 1957 to June 1960. The trend of sales over the last sixteen years is shown in a table.

D *F.251*

Hunt for fresh diamond deposits stepped up

Anon. *Diamond News* 1960 Vol 23 (9) p 27 (June)

Reports increased efforts being made by African producers to discover new sources of diamonds. The Diamond Research Laboratory has evolved improved methods of mining and recovering diamond, including a grease belt method of recovery and an optical diamond separator that checks the efficiency of other methods. *D* *Eb.12.36/Fb Hg.1456*

World diamond demand is strong

Anon. *Diamond News* 1960 Vol 23 (9) pp 23, 25 (June)

Discusses diamond prospecting and the possibility of new sources of diamond being discovered to satisfy continuing demand. *D* *Eb.12.31*

Problem of diamond exploration in desert countries and, in particular, in the Hoggar

J. Y. Thebault. *Bull scient econ BRMA* (Algiers) 1959 (6) pp 65-81 ; *IMM Abstr* 1960 Vol 10 (5) p 153 (June/July) (Original in French)

D *F.12.1313.3682*

First place in the world

Anon. *Diamond News* 1960 Vol 23 (10) p 23 (July)

More than 15 million ct of industrial diamonds, *ie* over two-thirds of the total world output, are imported annually by the US, which is said to hold first place among users of industrial diamonds. It is calculated that in 1960 Russia should need about 6 million ct of diamonds for industrial use.

D *Fc.25.33/Fc.25.42*

Diamond : USSR

Anon. *Miner Tr Notes* 1960 Vol 50 (5) pp 7-12 (May)

A survey of diamond mining conditions and problems in Yakutia. The material is derived from Russian publications for which full references are given.

D *Hd.332*

Prospecting and mining for diamonds in South-West Africa

Anon. *Diamond News* 1960 Vol 23 (10) p 13 (July) ; *Min Mag, Lond* 1960 Vol 103 (1) pp 5-6 (July)

Diamond Mining and Utility has provisionally agreed to cede to De Beers Consolidated Mines Ltd the right to prospect and mine for diamonds in Diamond Area No 2, a coastal strip between Walvis Bay and Luderitz, SW Africa. About 1,200 sq. miles will be retained by Diamond Mining. The terms of the agreement are outlined, and events preceeding it are described.

D *Eb.12.362/F Hd.362*

Sprinkling the earth in a diamond district

A. I. Efimov. *Priroda* 1959 Vol 48 (6) pp 113-114 (June) ; *Library of Congress Mthly Index Russ Access* 1959 Vol 12 (5) p 1437 (Aug)

D *Eb.12*

CONTENTS

Diamond Mining and Industry...	A233	Rock Drilling	A248
Physical, Chemical, and Mechanical Properties of Diamond	A235	Wire Drawing	A250
Physical, Chemical, and Mechanical Properties of Hard Materials	A236	Grinding and Polishing of Carbides and Metals	A250
Diamond, etc, in Instruments	A237	Machining Developments	A259
Hardness and Wear Testing	A238	Production, Grading and Recovery of Abrasive Particles	A261
Truing of Grinding Wheels	A239	Tool Production...	A262
Precision Machining of Metals	A241	Powder Metallurgy	A263
Cutting and Machining of Stone, Glass, etc ...	A246	Miscellaneous	A264
Gem Polishing	A248	Book Reviews	A265
		Trade Literature	A265
		Patent Lists	A267

Plan for expansion of Russian diamond fields

Anon. *Diamond News* 1960 Vol 23 (9) p 26 (June)

According to US consular sources, the 1959-65 plan for organization and expansion of the USSR diamond industry in Yakutia envisages a 16-fold increase by 1965 over the 1958 output. The chief problems to be overcome are those concerned with: extraction processes; scale of operations; priorities for different deposits; best type of power for industry and housing; transportation and communications; staffing, housing, and feeding of personnel. 1 illustr.

D *F.25.33*

Those who found Siberian diamonds

S. Maksimov. *Sib ogni* 1959 Vol 38 (2) pp 169-170 (Feb); *Library of Congress Mthly Index Russ Acces* 1959 Vol 12 (5) p 1406 (Aug) (Original in Russian)

The article is a review of a book by V. Osipov called *Secret of the Siberian platform.*

D *Eb.12.33*

Editorial [:] To develop a faster precision machine tool industry

Anon. *Machines & Tooling* 1960 Vol 31 (4) pp 2-3 (Apr) (Original in Russian)

It is stressed that Russian industry will find wide uses for diamond tools during the next seven years. The Scientific Research Institute of Diamond Tools and Methods of Diamond Tooling, as well as factories producing diamond tools, are urged to begin at once the manufacture of all types of high quality diamond tools needed by industry. *D* *N Qc*

South African mining in 1959 : Diamonds

L. A. Waspe. *Min Mag, Lond* 1960 Vol 102 (4) pp 209-215 (Apr)

Reviews briefly the main agreements and events of concern to the diamond industry.

D *F.Hd.361/F.25.361*

News from the diggings [:] Where 5,000 carats were once found

Anon. *Diamond News* 1960 Vol 23 (10) p 31 (July)

The old Postma diamond mine, which has not been worked since 1930, is to be re-opened soon.

D *F Hd.361*

News from the diggings [:] Nooitgedacht's all-time lowest

Anon. *Diamond News* 1960 Vol 23 (10) p 31 (July)

The lowest level of production in the eleven years' history of Nooitgedacht was registered in June, when out of 38 licensed holders only 28 found 94 diamonds weighing 64¼ carats. *D* *F Hd.361*

Sierra Leone diamonds

Anon. *Min Mag, Lond* 1960 Vol 103 (1) pp 17-18 (July)

It is reported from Freetown that there are now 966 alluvial diamond licence holders, with a labour force of over 13,000, operating in the Sewa River in the Wando and Gorama Mende Chiefdoms of the Kenema District.

D *Ebe Hd.3672*

Diamond [:] Belgium

Anon. *Miner Tr Notes* 1960 Vol 50 (6) pp 8-9 (June)

Figures show Belgian imports and exports of cuttable and polished diamonds during 1959. Values in US dollars and weight by carat are given with countries of origin and destination. Data on industrial diamond were not available for publication.

D *F.13.3235*

News from the diggings [:] Decline of Lichtenburg fields

Anon. *Diamond News* 1960 Vol 23 (10) p 31 (July)

The whole of the Lichtenburg alluvial fields are showing a definite decline in active digging. All hopes of making the Pypklip digging a success have now been abandoned. There are only a handful of diggers left, including the reserve workers.

D *Ebe.361*

News from the diggings [:] Diggings coming to an end

Anon. *Diamond News* 1960 Vol 23 (10) p 31 (July)

The alluvial diamond diggings in the far western Transvaal are petering out rapidly, it is reported.

D *Ebe.361*

Monthly review [:] Angola

Anon. *Min Mag, Lond* 1960 Vol 103 (1) p 6 (July)

The Angola Diamond Co report states that diamond production in 1959 attained the highest figure recorded in the company's history: 1,002,284 ct were recovered from mining operations and 13,403 ct were collected during prospecting. Of the total, some 60% was in gemstones and 39% in industrial diamonds. The programme of exploration for 1960 is outlined.

D *Eb.12.3676/F.13.3676*

Diamond [:] British Guiana

Anon. *Miner Tr Notes* 1960 Vol 51 (1) p 13 (July)

During 1959, diamond production in British Guiana, industrials 60% and gemstones 40%, increased about 89% over the quantity produced in 1958. The largest yield came from the newly opened upper Mazaruni district, an area that had previously been an Amerindian reserve. Production figures from 1955 to 1959 are given. Exports of diamond from British Guiana in 1959 reflected the production increase, rising from 31,093 ct valued at $1,394,000 in 1958 to 60,992 ct valued at $3,026,760 in 1959. 1 table.

D *F.13.3474*

Diamond [:] Ivory Coast, Republic of

Anon. *Miner Tr Notes* 1960 Vol 50 (6) p 10 (June)

Output by SAREMCI and SODIAMCI increased from 165,375 ct in 1958 to 187,361 ct in 1959. Another 588 ct were taken from illegal prospectors. A law imposing severe penalties on illegal operators was approved in Aug, 1959.

SAREMCI continued to study the treatment of diamond concentrate by the Lavodune process. Results obtained led to the decision to treat the entire 1960 output by this process in a new plant.

Exports of diamond from Jan-Nov, 1959 totalled 230,930 ct compared with 157,415 ct for the same period of 1958. *D* *F Hg/F.25.3662*

Diamond [:] Ivory Coast, Republic of

Anon. *Miner Tr Notes* 1960 Vol 15 (1) p 13 (July)

On Jan 12, 1960, the Council of Ministers authorized the establishment of five offices for the purchase, import and export of rough diamonds for 1960; these offices will be in the production areas. The Council also approved, in principle, the creation of the Coopérative Africaine de Recherches et d'Exploitations Diamantifères, a co-operative of African diamond prospectors.

D *Fb.251.3662*

I.D.B. in the new Africa

Anon. *Diamond News* 1960 Vol 23 (10) pp 10, 12 (July)

Compares illicit diamond buying in different parts of Africa and describes the efforts made to control it. 1 illustr. *D* *F.251.2598.36*

Venezuela's output

Anon. *Diamond News* 1960 Vol 23 (9) p 15 (June)

The output of diamonds in Venezuela in 1959 was nearly 95,000 ct, of which 69,673 ct were industrial stones, 15,104 ct cut gemstones and 10,209 ct were boart. Output was, therefore, slightly in excess of the 1958 figure, but considerably less than the 122,597 ct produced in 1957. *D* *F.13.347*

Diamond ore from three new mines

Anon. *Diamond News* 1960 Vol 23 (9) p 15 (June)

It has been reported that three mines, each producing between 1,000,000 and 2,000,000 tons of diamond ore yearly, are currently being brought into production in the Yakut ASSR area, where 98% of all Russian diamonds are located. *X* *Ec.332*

Belgian Congo largest producer

Anon. *Diamond News* 1960 Vol 23 (9) p 17 (June)

The world's largest diamond producer, by weight, is the Belgian Congo with 16,700,000 ct, according to figures recently presented to the World Diamond Federation in Johannesburg. Next comes South Africa, 3,600,000 ct; Ghana, 3,200,000 ct; Sierra Leone, 1,500,000 ct; Angola, 1,000,000 ct; Liberia, 800,000 ct; and Tanganyika, 500,000 carats.
D *F.13.36*

Société Minière du Bécéka—directors' report given at the general assembly of the 25th May 1960. Société Minière du Bécéka—rapport du conseil d'aministration à l'assemblée générale ordinaire du 25 mai 1960

Anon. *Diamant* 1960 Vol 4 (21-22) p 1 (May-June) (In French)

Gives production figures for the past ten years and information as to sales and prices during the past year. Mechanisation has been increased: 99.8% of the average production was mined mechanically as against 98.4% in 1958. Reference is made to a new central factory to replace local washing plants.
K *F.25.365*

Belgian Congo's boart

Anon. *Diamond News* 1960 Vol 23 (10) p 23 (July); *World Min* 1960 Vol 13 (9) p 63 (Aug)

The Société Minière du Bécéka expects to sell 10 million ct of diamond boart this year, according to a report from Brussels. This official forecast is based on sales during the first few months of 1960 which were higher than for the comparable period of last year.
D *Fdb.251.365*

Synthetic industrial diamonds. Diamanti industriali sintetici

Anon. *Macchine* 1960 Vol 15 (7) p 707 (July) (In Italian)

Statement by GEC on the company's synthetic diamond production. *M* *Fh Ha.342*

News in brief

Anon. *Industr Diam Rev* 1960 Vol 20 (235) p 117 (June)

Authorization has been requested in Spain for the installation in the free port at Barcelona of a plant for polishing and storing industrial diamonds for export. It will be the first factory of its kind in the country and have a 25% foreign capital participation. Uncut stones of between 0.07 and 0.025 ct will be imported. The machinery will be of Spanish manufacture.
D *Fc Hp.2635.3245/Fc.251.3245*

LITERATURE REQUESTS
Please quote the page number of the journal which contains the original reference, and the author and title of the article, in all cases.

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND

The infra-red absorption of hot semiconducting diamonds

C. D. Clark, P. Kemmey, E. W. J. Mitchell (Physical Research Lab, Reading Univ), B. W. Henvis (Naval Res Lab, Washington DC). *Phil Mag* 1960 Vol 5 (50) pp 127-139 (Feb)

Measurements of the absorption of p-type semiconducting diamonds have been made at temperatures in the range 450 to 600° K and over the wavelength range between 6 and 45 micron. The major effect observed is an absorption, which is present only in hot semiconducting diamonds, which increases with increasing wavelength and temperature. The increase with temperature is similar to that of the increase in carrier concentration as determined from measurements of the Hall effect.

The observed wavelength dependence differs from that predicted by the theory of intervalence band absorption for mass ratios of 1.04, 1.25, 2.5 and 5. It is possible to account for the shape of the spectrum using the single band free carrier theory of Donovan and March. However, the relaxation times deduced are small (c. 10^{-14} sec at 563° K) and there is a discrepancy between the calculated and observed magnitude of absorption. 8 illustr, 11 ref, 1 table.
X *Fn Ukjcb*

Models of grain boundaries in the diamond lattice. II. Tilt about ⟨001⟩ and theory

J. Hornstra. *Physica* 1960 Vol 26 (3) pp 198-208 (Mar)

Models are presented for large-angle grain boundaries with a ⟨001⟩ tilt axis. For all angles of tilt, dislocations without dangling bonds can be used in the construction of these models. One model may be considered either as an array of edge dislocations or as an array of 45° dislocations. In the last section the crystallography of regular grain boundaries is discussed, the grain-boundary index is introduced and the application of the transformation matrix to the grain-boundary problems is illustrated.

See also *Industr Diam Abstr* 1959 Vol 16 p A226 (Dec). 7 illustr, 13 ref. *X* *F Ubb*

Graphitization of diamond

M. Seal (Cambridge Univ). *Nature, Lond* 1960 Vol 185 (4712) pp 522-523 (Feb 20)

An earlier article by the present author in *Nature* [1958 Vol 182 (1264)] reported some results of the high-temperature transformation of diamond to graphite, when diamond powder of 0-1 μ particle size was used. More recent work has shown that the interpretation of results then made is unjustified and this communication describes the diffraction patterns in more detail and gives an interpretation now considered more reasonable. 2 ref. *D* *F Ha*

Composition of impurities in diamonds from the Urals and Yakutia

M. A. Gnevushev, I. A. M. Kravtsov. *Dokl AN SSSR* 1960 Vol 130 (6) pp 1319-1321 (Feb); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 692 (May) (Original in Russian)
D *F Gk U.33*

Etching and dissolving traces on Yakutian diamonds

M. A. Gnevushev, N. A. Bobkov, Z. V. Bartoshinskii. *Min sbor* 1957 (11) pp 22-27; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 703 (May) (Original in Russian)
D *F Ubm.332*

Alleged formation of an intermediate diamond structure on heating diamond

F. A. Raal (Diamond Research Lab, Johannesburg). *Nature, Lond* 1960 Vol 185 (4712) p 523 (Feb 20)

In a current programme of investigation, diamond powders have been heated to about 1,400° C in an inert atmosphere for various lengths of time. X-ray and spectrographic analyses of the powders before and after heating have confirmed the observations of Seal in *Nature* [1958 Vol 182 (1264)],but these experiments show that the existence of an intermediate atom structure in diamond after heat treatment can be discounted. An obvious explanation for the extra X-ray reflexions and the increased silicon content of the heated diamond powder is given. Considerations are described which make it evident that the extra X-ray and electron diffraction spots, observed by Seal in heat-treated diamond powders, are due to the existence of easily detectable amounts of silicon carbide resulting from chemical reaction at elevated temperatures. 1 table, 3 ref. *D* *F Ha Ub*

Revealing the emergence of dislocations on the surface of a crystal by the etch method

V. R. Regel, A. A. Urusovskaya, V. N. Kolomiichuk. *Sov Phys, Crystallogr* 1960 Vol 4 (6) pp 895-917 (June) (Original in Russian)

Diamond is among the crystals mentioned. 1 table, 264 ref. *D* *Bd Ql Ubmz/Fd Ql Ubmz*

Causes of optical anisotropy in diamonds

Z. V. Bartoshinskii, M. A. Gnevushev. *Min sbor* 1958 (12) pp 57-66; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 530 (May) (Original in Russian)

D *F Ukz*

New sculpture on diamond faces

Z. V. Bartoshinskii. *Min sbor* 1957 (11) p 340; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 530 (May) (Original in Russian)

D *F Ubm*

Highlights at the Gem Trade Lab in New York

G. R. Crowningshield. *Gems & Gemology* 1960 Vol 10 (1) pp 7-10, 31 (Spring)

The second largest diamond found in Arkansas in the past twenty years is described and photographed. The stone weighs 6.43 carats.

The electrical conductivity test, devised by Dr. J. F. H. Custers, was used to examine the Hope Diamond recently in Washington. The stone proved highly conductive, as expected. The only electrically conductive diamond examined in the Gem Trade Laboratory so far, apart from steel-blue to sapphire-blue natural stones, has been a nondescript greyish-greenish yellow stone. De Beers' Diamond Research Laboratory has stated that only type IIb diamonds are electrically conductive, but the New York Laboratory continually checks all diamonds of unusual colour for this property, since much about them remains uncertain.

D *F U.342/F Uec.1312*

Financial help for research

Anon. *Diamond News* 1960 Vol 23 (9) p 15 (June)

A post-graduate research group at Reading Univ's new department of physics, studying the electrical and optical properties of irradiated diamonds, is receiving financial assistance from the Central Electricity Generating Board, the Atomic Energy Research Establishment, and Industrial Distributors, Limited. Another research project is being supported by the Diamond Research Laboratory in Johannesburg.

Y *F Hx Ue.131/F Hx Uk.131*

Absorption spectra of diamonds

G. O. Gomon. *Optics and Spectroscopy* 1960 Vol 8 (3) pp 210-211 (Mar)

The absorption spectra of diamonds from different Russian deposits were studied at various temperatures. Some forty differently coloured and luminescent specimens, octahedra and plates, were examined with the aid of a SF4 spectraphotometer and were also photographed with a quartz ISP-28 spectrograph. Results obtained, together with those of other authors, are given in a table, and conclusions and comparisons are recorded. 1 illustr, 1 table, 4 ref.

D *F Ukjc*

'Grown diamonds'

Anon. *Diamond News* 1960 Vol 23 (10) p 23 (July)

The New York publication *Missile Design and Development* reports that the Carnegie Institute of Washington, DC, has grown diamonds 0.004 in. in size under 1,100,000 lb/sq. in. pressure and 2,700° F temperature. *D* *Fh Ha*

FP 1,195,862 Industrial Distributors (1946) Ltd

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Method for the modification of the properties of type IIb diamonds. Procédé pour la modification des propriétés des diamants du type IIb

The diamonds are irradiated, *eg* with charged particles (electrons, positrons, α-particles). The energy of the electrons should be of the order of 1 MeV. A flux of about 2×10^{16} electrons/cm² is utilized with a beam current of 4 μ Amp/cm². When irradiating with non-charged particles, these are selected from the group consisting of neutrons and γ-particles using an activity coefficient of 6 (*ie* 1.6×10^{15} thermal neutrons/cm²) for 45 minutes. γ-particles should have an energy of 0.5 to 0.9 MeV. (13 claims). *J* *F U.545*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF HARD MATERIALS

Anisotropy of distribution of the electron density of atoms in diamond-like crystals

K. P. Mamedov. *Kristallografiia* 1959 Vol 4 (4) pp 624-625 (July-Aug); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 530 (May) (Original in Russian)

D *Bdf Ucc*

Infra-red absorption bands in α-quartz in the 3 μ-region

A. Kats, Y. Haven (Philips Research Labs, Eindhoven). *Phys Chem Glasses* 1960 Vol 1 (3) pp 99-102 (June)

3 illustr, 3 ref. *D* *Bcb Ukjcb*

Kinetics of the transformation of quartz

A. L. Roberts. *Brit Ceram Abstr* 1960 (5) p 201A (May)

Book, Kinetics of high temperature processes, Chapman & Hall, London. 1959, 222 pp.

[Not in library of Industrial Diamond Information Bureau]. *D* *Bcb Unz.52*

Experimental studies of atomic vibrations in crystals and of their relationship to thermal expansion

K. Lonsdale. *Z Kristallogr* 1959 Vol 112 p 118; *Brit Ceram Abstr* 1960 (5) pp 203A-204A (May) (Original in Russian)

D *Bd Udc*

Diffuse scattering of X-rays by quartz crystals before and after neutron irradiation

E. V. Kolontsova, L. A. Ignat'eva. *Sov Phys, Crystallogr* 1960 Vol 4 (6) pp 781-785 (June) (Original in Russian)

A comparison has been made of the intensity and form (in reciprocal lattice space) of the regions of diffuse scattering from quartz mono-crystals before and after neutron irradiation. 5 illustr, 17 ref.

D *Bcb Qvc*

Lattice defects

W. Dekeyser. *Bull Soc Franç Céram* 1959 (45) p 1; *Brit Ceram Abstr* 1960 (5) p 204A (May) (Original in French)

A general introduction to the subject is given.

D *Ubb.2591*

Property measurement at high temperatures

W. D. Kingery. *Brit Ceram Abstr* 1960 (5) p 213A (May)

Book, J. Wiley & Sons Inc, New York. 1959, 416 pp. Price £6 12s.

[Not in library of Industrial Diamond Information Bureau]. *D* *B U Vbb.52*

Precious stones

IA. IAsin. *Ukrania* 1959 (20) p 31 (Oct); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 530 (May) (Original in Russian)

D *Bb*

A new emerald substitute

R. J. Holmes, G. R. Crowningshield. *Gems & Gemology* 1960 Vol 10 (1) pp 11-22 (Spring)

Method of production is described and details are given of properties. The history of emerald synthesis is traced briefly. 9 illustr, 7 ref.

D *Bbjbb Ct/Bbjbb U*

The strength of solids

K. J. Pascoe. *Nature, Lond* 1960 Vol 187 (4733) p 659 (Aug 20)

Summarizes Prof. A. J. Cottrell's discourse to the Royal Institution, which emphasized the importance of the subject in engineering. Weakness of brittle materials, which may have very high inter-atomic forces and which should therefore have very high strength, is among topics discussed. *D* *Bz Unl*

A theory of the abrasion of solids such as metals

J. Goddard, H. J. Harker, H. Wilman. *Nature, Lond* 1959 Vol 184 (4683) pp 333-335 (Aug 1)

Describes work at the Mechanical Engineering Research Lab of the DSIR and the Imperial College of Science and Technology, Univ of London. 3 illustr, 1 table, 4 ref. *D* *Bf Ung.21*

Finish machining critical parts prior to heat treatment

G. C. Close. *Mod Mach Shop* 1960 Vol 33 (3) pp 97-99 (Aug)

The relatively high temperature of a metal alloy is being exploited to finish machine aircraft fittings before heat treating. 4 illustr. *X* *Bfx Chm*

Shear-zone, size, compressive stress, and shear strain in metal cutting and their effects on mean shear-flow stress

D. Kececioglu. *ASME Trans Ser B J of Engng for Industr* 1960 Vol 82 (1) pp 79-86 (Feb); *Battelle Tech Rev—Abstr* 1960 Vol 9 (6) p 364a (June) (No 7002)

D *Bf Ceg Unq*

The chipability of automatic machine materials

H. Schallbroch, E. Mayer. *FeinwTech* 1960 Vol 64 (6) pp 206-216 (June) (In German)

16 illustr, 2 tables, 26 ref. *A* *B Unp*

Wimet XL35 cemented [sintered] carbide

Wickman Ltd, Coventry. *Mach Shop Mag* 1960 Vol 21 (7) p 473 (July)

Wear resistance and toughness are claimed as characteristics of the new grade of Wimet XL35 sintered carbide, developed for milling steel. Selection of the correct grain structure gives superior resistance to thermal cracking at the cutting edge, despite the hardness of the material. Tool life has been considerably extended in several operations, it is said.

D *Bfd Ceq Rh*

Beryllium presents new metalworking problems

Anon. *Metalworking Prod* 1960 Vol 104 (23) pp 68-70 (June 8)

5 illustr. *D* *Bfu Ceq.1313*

Emission microscope

Royal Dutch/Shell Group Labs, Amsterdam. *Research, Lond* 1960 Vol 13 (9) pp 373-374 (Sep)

An emission microscope is being used to study the mechanism of adsorption on the crystal faces of a catalyst and the nature of the interaction between the adsorbed molecules and the catalyst surface. 1 illustr.

D *Wcmz*

Crystallography

Anon. *New Scientist* 1960 Vol 8 (197) p 501 (Aug 25)

A team is working at Pennsylvania State Univ to catalogue all the available data concerning crystalline solids on to punched cards and magnetic tapes.

D *Vh*

DIAMOND, ETC, IN INSTRUMENTS

Modern developments in optical instruments

G. E. Fishter, J. H. Bach. *Trans Soc Instrum Tech* 1960 Vol 12 (2) pp 90-100 (June)

15 illustr, 30 ref. *D* *Wc.132*

International Machine Tool Exhibition, 1960 [:] Hilger & Watts Ltd

Anon. *Engrs' Dig* 1960 Vol 21 (7) pp 105, 107 (July)

The wide range of scientific instruments shown included an improved design of surface finish microscope, a vertical measuring machine, and a number of new instruments such as the 'Minidekkor', a lightweight auto-collimator which measures simultaneously angular displacements in two directions.

D *W.27*

An introduction to interferometry

T. J. O'Donnell. *Amer Mach* 1960 Vol 104 (12) pp 123-146 (June 13)

32 illustr, 1 table. *D* *Vr*

Machine tool programming systems

P. Martens. *Tooling* 1960 Vol 14 (7) pp 51, 54-55, 57-65 (July)

14 illustr. *D* *Pr Wp*

USP 2,914,938 (Mar 25, 1957) **L. H. Laakso, M. E. Abbot**

Apparatus for investigating surface profiles

The tracer carrier is guided by a pilot plane and inaccuracies in the movements of the actuator slide cannot be transferred to the tracer slide because of the loose connection between actuator and tracer unit, which should be provided with a plurality of skids, preferably three, contacting the pilot plane (optical flat) and so located as to preclude any possible tilting of the carrier during operation. (7 claims, 4 illustr). Ref cited : USP 2,633,020 (type of instrument).

J *Wgfb.545*

HARDNESS AND WEAR TESTING

Problems concerning the standardization of pyramid indentation methods of micro-hardness testing on metallic materials

M. M. Chruscov, E. S. Berkovic. *Standartiz, Moscow* 1960 Vol 24 (1) pp 47-51 ; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (3) p 274 (Mar) (Original in Russian)

Includes the description of a proposed standard for determining hardness by means of a diamond pyramid under a load of 5-500 grammes.

K *Bf Cvdb Nde.255*

Cone cracks in fused silica

J. J. Benbow (ICI Ltd). *Proc phys Soc, Lond* 1960 Vol 75 pp 697-699

Cone fractures were produced by indenters ranging from 1/64 in. to ¼ in. diameter. These cracks had significantly smaller semi-angles than those produced in glass. They ceased to grow about ten minutes after each increment of the load, and disappeared when the specimen was unloaded, unlike those in glass. 2 illustr, 4 ref.

A *Bcb Cvd Unt*Bm Cvd Unt*

Selected abstracts on the mechanical behaviour of ceramics

H. Palmour III, W. E. Kriegel, J. J. DuPlessis, G. O. Harrell. *Engng School Bull, North Carolina State College* 1959 (73) 151 pp (July)

The section on micro-hardness, included under the heading 'Research and testing methods', contains many abstracts of articles on hardness testing with diamond indenters which have appeared in various journals since 1945, and which were reviewed in *Industrial Diamond Abstracts* when they were first printed.

D *Bl Cvd Nd*

Studies on the mechanical strength of the photosensitive opal glass

M. Tashiro, S. Sakka (Kyoto Univ). *J ceram Ass Japan* 1960 Vol 68 (774) pp 158-163 (June) (In Japanese, abstr in English)

When a lithium-containing photosensitive glass is exposed to ultraviolet light and then subjected to heat treatment, it changes into a polycrystalline material with good mechanical properties. In order to present the relation between the mechanical strength and the grain size of the constituent crystallites of the resultant material, tests for bending strength and Vickers hardness tests were made on the polycrystalline specimens in various grain sizes. 7 illustr, 11 ref.

L *Bm Cvd Nde*

Hardness-temperature characteristics of some simple glasses

J. H. Westbrook (GEC Research Lab). *Phys Chem Glasses* Vol 1 (1) pp 32-36 (Feb)

Micro-indentation hardness studies *in vacuo* on a number of simple glasses show a monotonic decrease in hardness with temperature. A Vickers pyramidal indenter, loads in the range 10 to 200 g, and loading rates of the order of 1 mm/min, was used.

See also *Industr Diam Abstr* 1960 Vol 17 p A189 (Aug). 11 illustr, 22 ref.

D *Bm Cvdb Nde Vb*

Improved method for measuring abrasion resistance of coatings

A. G. Roberts. *Tech News Bull, US Bur Stand* 1960 Vol 44 (7) pp 113-114 (July)

The abrasive jet method has been speeded up and improved, though not basically altered. Abrasive powder is propelled by pressurized gas onto the test specimen and abrasion resistance is measured by the time taken to abrade through the coating, and is expressed in terms of unit thickness. 1 illustr, 2 ref.

L *Cw Rdb*

Some perspectives of the use of radioactive isotopes and atomic rays in metallurgy and other branches of technical knowledge

A. M. Samarin, M. S. Fomicev. *Izv Akad nauk SSSR, Otd tech nauk. Mettallurg i Topl, Moscow* 1959 (6) pp 121-126 ; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (4) p 347 (Apr) (Original in Russian)

In the field of machine construction, these methods may be used for research into friction, wear, and chip-producing process.

K *Pr Qc Swz/Pr Qc Syb*

Different types of tool wear. Verschiedene Arten des Werkzeugverschleisses

Anon. *Technik u Betrieb* 1960 Vol 12 (7) pp 131-132 (July) (In German)

Wear can occur in three different ways : on the chip face, the clearance face, or both faces at once. Influencing factors are cutting conditions such as pressure, speed, and temperature, as well as the amount of stock removal required. Coolant reduces the temperature, and thus the wear, of the clearance face more than that of the chip face. 3 illustr.

A *Pr Unr.21*

USP 2,912,105 (May 28, 1954) **R. B. Allured, J. L. Walker, General Motors Corp**

Hardness testing and sorting

When a steady predetermined load is separately applied to several different test specimens through a diamond or ball indenter, a dynamic strain will be induced in the specimen : this is sensed by strain-sensing means which provide an electrical signal corresponding to the dynamic build-up of load in the system. The strain signal is amplified and triggers an accurate fixed electronic timing circuit, adjusted to close an electronic gating circuit at the end of a fixed timing cycle of a timer. The actual amplitude of the strain signal at the instance of closure of the gating circuit will then be a measure of the relative hardness of the specimen. The strain signal passes to a sorting circuit which includes relays to operate at desired levels of signal voltages. The relays will thus classify the material into hardness groups. (3 claims, 7 illustr). Ref cited : 5 USP.

J *F:Cvd.545/F Hfc.545*

USP 2,914,937 (June 2, 1954) **A. R. More, H. W. Wallace & Co Ltd**

Hardness tester

Micro-hardness testing is only possible where frictional losses are eliminated. Hitherto, hardness testers for testing thick rubber samples have required loads of some 20 g or more to move the plunger of the dial gauge, due to internal friction which made them unsuitable for micro-hardness testing. Friction is avoided in the new tester in which the indenter is held by two leaf springs and its position indicated by a variable capacitor associated with the indenter plunger and its support. The indicating device includes a high frequency oscillator, an amplifier, and a telephone receiver, earphone or loudspeaker, or a visual indicating device. The sample is mounted on a table moved by a wedge device in connection with a micrometer gauge which permits indication of vertical movement in units of 0.00001 in. without backlash. (15 claims, 4 illustr). Ref cited : 7 USP ; 1 FP ; 1 GP.

J *Wgh.545*

USP 2,917,919 **R. Schulze, H. Broschke, Ernst Leitz GmbH**

(May 24, 1952—conv date, Germany)

Hardness-testing device

In the usual designs it is found that the weights to be applied to the diamond indenter cause a slight bending of the guide lever before contact is made. The guide lever straightens up when the diamond touches the specimen, relieving the guide lever. But the very slight lateral or horizontal motion of the diamond point gives rise to inaccuracies, which are eliminated by providing independent separate supports for the guide lever carrying the diamond and for the load applying structure. Fig 1 shows the indenter 11 on guide lever 7.

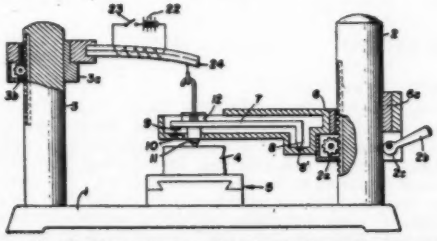


Fig 1. The hardness tester, showing independent supports for guide lever 7. USP 2,917,919.

The weights 12 are suspended by a wire or thread from the free end of bi-metallic strip 24, which when heated on closing switch 23 curves downwardly, transferring the load on the indenter without any lateral motion of the diamond point. Instead of heating a bi-metallic strip, an electric current may be passed directly through the wire which initially holds the weights. Linear expansion of the wire then causes the transfer of the load to the indenter. (6 claims, 3 illustr). Ref cited : 10 USP ; 1 GP ; 1 Swiss P ; *Microtecnic* 1952.

J *Wghc.545*

DIAMOND TECHNOLOGY

First published 1942 as " Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 ages, 486 illustrations, 94 tables, and Indexes. Prom NAG Press Ltd., 226 Latymer Court, Fondon W 6. 55s 0d, post free.

L

TRUING OF GRINDING WHEELS

Motorize wheel dressing . . . and records—Cut diamond wheel costs

M. Damerell (Interview). *Grinding & Finishing* 1960 Vol 6 (6) pp 49-50 (June)

Tool design was studied on the premise that a diamond wheel should be dressed as carefully as it is used. As a result, a small motor-driven diamond wheel dresser was developed for mounting on the chuck of surface grinders and the table of cutter grinders. This enabled dressing of the wheel under micrometer control, without relying on the wheel itself to supply the driving force to the dressing unit. However, systematic wheel dressing was not the whole answer. The question of how much of a diamond wheel is used on each job remained. If studies are made, controls set up, and intelligent analysis made of the data, substantial savings can be made, it is stated. 3 illustr.

E *Nv:Cg Nj Psf*

The accurate and productive profiling of grinding wheels on surface grinders

B. M. Malkin. *Vestn Masstro, Moscow* 1960 Vol 40 (2) pp 60-64 ; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (4) p 317 (Apr) (Original in Russian)

Describes a new and highly efficient process for truing profile grinding wheels with the aid of a template and a diamond truing tool, giving details of the design of both the grinding machine and the truing device.

K *Abm Cgf Nj*

Centre drills which allow multiple regrinds

Yu. P. Kholmogortsev. *Machines & Tooling* 1960 Vol 31 (4) p 39 (Apr) (Original in Russian)

Describes a centre drill which allows multiple regrinds even when the pilot is broken. The drill is made single-ended and is a combined centre drill and twist drill. The grinding wheel is dressed by a diamond mounted on a special slide on the machine table. The cylindrical surface of the wheel is dressed by traversing the table, and the taper position of the wheel by traversing the slide. 3 illustr.

D *Ab Cg Njb Psf/Cfb Pr*

Thread grinder

United States Electrical Tool Co, Ultra Precision Spindle Div, 3640 Llewellyn St, Cincinnati 23, Ohio. *Mod Mach Shop* 1960 Vol 33 (2) p 273 (July)

This special purpose thread grinder is designed for engine lathe cross slide mounting for thread grinding. It features spindle adjustment for various lead angles, and the motor can be adjusted with the spindle angle. A built-in wheel truer can be provided with necessary adjustments for various wheel angles. 1 illustr.

L *Chcp Pr Psf*

A new dressing attachment

Keith Precision Engineering, Shoreham-by-Sea, Sussex. *Industr Diam Rev* 1960 Vol 20 (235) p 116 (June)

See Industr Diam Abstr 1960 Vol 17 p A146 (June). 2 illustr. *D* *Pj*

Magerle FPA-10 form surface grinder

Gaston E. Marbaix Ltd, London SW 11. *Metalworking Prod* 1960 Vol 104 (25) p 214 (June 22)

An important development incorporated in this machine is the new crush forming attachment built into the wheelhead. 1 illustr.

D *Chcb Pr.27*

Profiling grinding wheels by means of diamond impregn.ted inserts. Profilieren von Schleifscheiben durch Diamantfliesen

Ernst Winter & Sohn, Hamburg 19. *TZ prakt Metallbearb* 1960 Vol 54 (6) p 281 (In German)

2 illustr. *A* *Ab Cgf Nje*

Orcutt type GC 48 gear grinding machine

Gear Grinding Co Ltd. *Machinery, Lond* 1960 Vol 97 (2486) pp 5-6 (July 6)

The machine operates on the well-established Orcutt formed wheel principle. The diamonds for truing the involute shapes on the wheel, as they are needed for grinding the flanks on the gear teeth, are controlled by separate templates of 1 to 1 ratio. Truing the periphery and fillet radii for grinding the roots of the gear teeth is done by a separate diamond, which can be traversed across the face of the wheel and swung through an arc. Limit switches and micrometer stops control the setting of this diamond for radius and the angle through which it is swivelled to ensure smooth blending of the radius with the involute portion on the wheel. 1 illustr.

D *Abmd Cg Nj.27*

Diamesh roller dressing equipment

L. M. Van Moppes & Sons (Diamond Tools) Ltd, Basingstoke, Hants. *Machinery, Lond* 1960 Vol 97 (2486) p 45 (July 6)

It is claimed that considerable economies can be effected in the initial shaping and subsequent dressing of form grinding wheels by the use of Diamesh roller dressing equipment. The life of the dressing rolls used in this equipment is said to be considerably longer than that of other types of form dressing equipment, and complex profiles can be shaped or dressed without the need for reducing the speed of the wheel. The wheel forming operation is similar to conventional roller crush forming, but the roll employed is made of sintered metal powder, and has a large number of small diamonds embedded in the matrix. 1 illustr.

D *Ab Cgf Nje.27*

Matrix No 66 internal thread grinder

Coventry Gauge & Tool Co Ltd. *Machinery, Lond* 1960 Vol 96 (2485) pp 1608-1609 (June 29)

Internal screw threads up to 1 in. diameter, and with number of threads from 12 to 60/in., can be ground for a maximum length of 1 in. on this machine. Grinding is done by a multi-ribbed wheel mounted on a tungsten carbide stem, which is held in a collet in the nose end of the high-frequency spindle unit. The spindle may be tilted through 7° to suit the helix of the threads to be ground and the entire wheelhead can be adjusted for setting the centre line of the wheel coincident with the work axis. The wheelhead can be rapidly moved towards the rear by an air cylinder to bring it from the grinding to the wheel dressing position. The action of the patented diamond truing attachment, mounted on the rear of the workhead, is such that a barrel form is produced on the wheel. In consequence, when the wheel, set at the helix angle of the threads, is brought into engagement with the work, interference at the ends is avoided and grinding is carried out by all the ribs. The attachment is geared to the workhead and during the truing operation several cuts are taken on the wheel by the diamond, with the tool set at a different position for each pass, in order to produce the barrel shape. Alternatively, a wheel crushing unit may be mounted on the wheelhead when parts are to be thread ground on a quantity production basis. 1 illustr.

D *Chcp Pr:Nj Psf.27*

Matrix No 67 worm grinding machine

Coventry Gauge & Tool Co Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (25) p 219 (June 22)

This automatic machine has been designed for high speed precision production of ball track steering worms or similar components. An automatic dresser is mounted in a readily accessible position on the wheelhead spindle housing and can be set to remove from the grinding wheel any amount from 0.0005 to 0.003 in. at each dressing cycle. It uses a horse-shoe type former allowing the diamond to swing 180 degrees. 1 illustr.

D *Chcq Prs:Nj Psf.27*

Abwood ASG-1 rotary surface grinder

Abwood Machine Tools Ltd, Princes Rd, Dartford, Kent. *Metalworking Prod* 1960 Vol 104 (25) p 215 (June 22)

This rotary table, vertical-spindle surface grinder incorporates automatic cycling and is suitable for grinding both flush and recessed annular faces up to 15 in. diameter. Diamond sizing permits consistent repetitive sizing to 0.0005 in. and automatic wheel dressing between roughing and finishing cuts. Hydraulic power is used for wheel rise and fall of the wheel truing diamond, among other functions. 1 illustr.

D *Chcm Prb:Nj Psf.27*

Moore No 2 precision jig grinder

Catmur Machine Tool Corp Ltd, London W 11. *Metalworking Prod* 1960 Vol 104 (25) pp 237-238 (June 22)

An air-driven grinding head with speeds steplessly variable up to 80,000 rev/min is one new feature. Another is a heavy-duty slot grinding attachment which can also be used with a wheel truing ring unit, such as the Diaform, for truing the shape of the wheel for form grinding operations. Provision is made for contour grinding. 1 illustr.

D *Az Chcw Pr Psf.27*

USP 2,911,765 (July 20, 1953) **A. A. Studler, C. B. Studler**

Refacing machine

The machine is particularly useful for refacing the seat faces of poppet valves. As the faces of such parts vary considerably in width, a mechanism is desirable which permits quick setting for altering the length of travel imparted to the face to be refaced. The part must be correctly held in position and rotated with precision about its own axis while sealed against the entrance of detritus. The grinding face is trued by a diamond on a stem, adjustably held on an arm pivoted on the main carriage and moved into and out of operative position by a handle. When adjusted to touch the wheel-face, the carriage is reciprocated and the diamond passes across the wheel-face. (22 claims, 8 illustr). Ref cited : 19 USP.

J *Chp Pr:Nj Psf.545*

DAS 1,072,505 **G. Gluchowicz, Ulvsunda Verkstaeder** (July 12, 1954—conv date, Sweden) **AB**

Control of grinding machines by a measuring device. Messteuerung fuer Schleifmaschinen

A finish ground workpiece is passed through a feeler measuring device which automatically adjusts the position of the diamond point for truing the grinding wheel. (1 claim, 3 illustr). Ref cited : 1 GP ; 2 FP ; 1 BP ; 6 USP ; *Industr Anzeig* 1954.

J *Chc Pr:Nj Psf W p.545*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

USP 2,912,971 (May 22, 1958) **H. C. Miller, Super-Cut Inc**

Diamond dressing tool assembly

The tool assembly is designed to facilitate the application of the truing diamond to the grinding wheel in certain directions relative to the crystallographic structure of the diamond and to the rotating surface of the grinding wheel, in order to produce maximum resistance to abrasion on the part of the diamond and maximum truing effect on the wheel face. In particular, three pre-determined positions of angularity are readily obtainable, as seen in Fig 2 and 3, by setting clamping

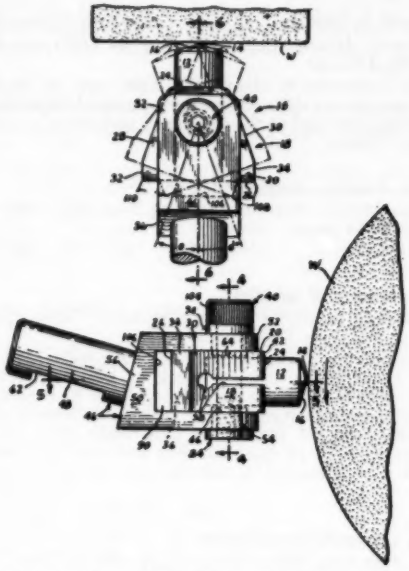


Fig 2 (above) and 3. Illustrations of the assembly allowing easier application of diamond to wheel. USP 2,912,971.

block 18 either with the diamond tool in medial position or displaced to the right or left, as shown in broken lines, through equal angles of 18°, in which position edges 108 or 110 abut against face 106. After adjustment, clamping bolt 40 is tightened and the diamond tool secured in adjusted position through the resiliency of the U-shaped head 50 and split block 18. (11 claims, 6 illustr). Ref cited : 4 USP ; 1 BP.

See also USP 2,890,694 [*Industr Diam Abstr* 1960 Vol 17 p A38 (Feb)].

J *Ab Cg Njc Psf.545*

FP 1,196,786 **AB Svenska Kullagerfabriken** (June 24, 1957—conv date, Sweden)

Method of automatic grinding and device for carrying out the method. Procédé de rectification automatique et dispositif pour le mise en oeuvre du procédé

When grinding continuous series the repetitive process consists of three steps, *ie* roughing, truing, finishing. In order to obtain the required precision automatically, the position of the truing diamond is made dependent on the duration of the finishing step, so that the truing diamond takes a deeper cut if the finishing time is too short, and takes a lesser cut if the finishing time is too long. (5 claims, 4 illustr).

J *Chc Prs.545*

USP 2,914,057 (July 18, 1957) **I. V. Abadjeff, Leland-Gifford Co**

Truing tools for a grinding wheel

The truing device is equipped with two diamond tools to true the face and the edge of a grinding wheel in a drill sharpening machine. One of the diamond tools is mounted on an arm pivoted on an axis parallel to the axis of the wheel ; the other diamond tool is mounted on an arm at right angles thereto. Fig 4 shows the general arrangement of diamond points 152 and 156 on arms 150 and 154 with regard to wheel 42. Arm 154 is

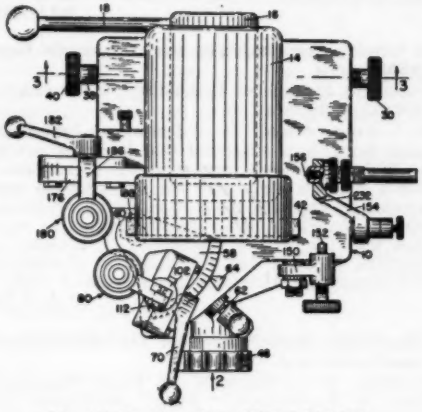
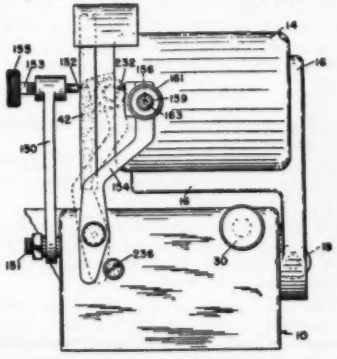


Fig 4 (above) and 5. USP 2,914,057.



provided with a gauge stop 232, seen in Fig 5, to adjust point 152 by hand-wheel 155 for accurate alignment towards the flat face of wheel 42. 236 is a stop pin to adjust arm 150 in correct gauging position. (4 claims, 5 illustr). Ref cited : 1 USP.

J *Ab Cg Njc Psf.545*

PRECISION MACHINING OF METALS

Obtaining high performance from ceramics and carbides

A. O. Schmidt, J. R. Roubik, I. Ham, R. F. von Turkovich. *Tool Engr* 1960 Vol 45 (2) pp 55-61 (Aug)

Economies in the use of ceramics stem from high metal removal rates and improved finishes, but in some cases carbides perform better. Tests conducted by the authors can help in selecting optimum cutting tools and cutting conditions, it is claimed. 7 illustr, 1 table.

D *Pdc Uqe.1311|Pdd Uqe.1311*

Design, use and care of diamond cutting tools
J. Taeyaerts. *Carbide Engng* 1960 Vol 12 (6) pp 14-18 (June)

The article does not set out to re-state the advantages of diamond cutting tools, but rather to discuss tool geometry and care so that greater benefits may be derived from using diamond tools. Characteristics of diamond are outlined to make it clear why geometry must differ from carbide or ceramic tool design and rules to follow are given. Metallic and non-metallic materials, suitable for diamond turning and boring, are listed with details as to use and care. 15 illustr.
D *Nf Qb/Nf.138*

Shear forming, free-machining steel test results highlight ASME talks
Massachusetts Institute of Technology. *Amer Mach* 1960 Vol 104 (11) p 83 (May 30)

As a result of tool life studies of resulphurized and leaded steels, it is suggested that in screw machining with high speed tools certain critical speed rates may cause a built-up edge, and that this problem may be corrected by changing the feed either up or down. An optimum tool-chip contact length appears to exist for which tool life will be maximum at a given speed. Variations in stock left for precision grinding cause small, perceptible variations in the finished work.
L *P Rwb Uqe.21*

Free machining steel, Pt I—Tool life characteristics of resulfurized steel
M. C. Shaw, P. A. Smith, N. H. Cook (Massachusetts Institute of Technology). *ASME Production Engng Conference Paper* (60-Prod-2); *Mech Engng, NY* 1960 Vol 82 (7) p 68 (July)

Tool wear and tool life characteristics of a series of five steels of different sulfur content are presented for different values of cutting speed, feed, cutting fluid, and cold work.
D *P Rw Uqe*

Free-machining steel, Pt II—Tool life characteristics of leaded steel
M. C. Shaw, P. A. Smith, N. H. Cook. *ASME Production Engng Conference Paper* (60-Prod-4); *Mech Engng, NY* 1960 Vol 82 (7) p 68 (July)

HSS tool life results are presented and discussed for a leaded and non-leaded steel from the same heat. Variables investigated include cutting speed, feed, cutting fluid, and cold work.
D *P Rwb Uqe*

Tool signature — basis for intelligent application
H. Frommelt. *Mach Tool Blue Bk* 1960 Vol 55 (7) pp 91-95 (July)

The cutting and relief angles of a tool, when properly specified, constitute its 'signature'. The importance of angle specification and its bearing on success or failure in machining operations is stressed. Various angles are discussed and described with the aid of diagrams. 5 illustr.
D *P Uqcz*

More control on machine tools
E. J. C. Fowell (R. A. E. Farnborough). *Control* 1960 Vol 3 (26) pp 97-100 (Aug)

Some of the controlled machines exhibited at the recent International Machine Tool Exhibition are reviewed. 6 illustr, 2 ref.
D *Pr Wp.27*

Programme-controlled machine tools
R. C. Brewer. *Engrs' Dig* 1960 Vol 21 (6) pp 77-97 (June)

A general introduction is followed by descriptions of various types and makes of machine. 47 illustr, 34 ref.
D *Pr Wp*

Watch repairing. Pt 56
W. J. Gazeley. *Watchmaker* 1960 pp 99-101 (May)

The article deals with the making of a balance staff from a silver steel rod, and describes the operation of turning a ferrule from the rod. 5 illustr.
L *Bfd Ceqbb*

Watch repairing Pt 57
W. J. Gazeley. *Watchmaker* 1960 pp 78-79 (June)

The fitting of a balance staff is described, including the turning, polishing, and burnishing of the pivots. 3 illustr.
L *Az Ceqb/Az Chm*

Lubricants in industry. Les lubrifiants dans l'industrie
P. Gilbert. *Mécan Élect* 1960 Vol 44 (133) pp 57-60 (May) (In French)

It is important to choose the right type of lubricant and the correct distribution, both in the lubrication of machine parts and in the wetting of tools such as cutting tools. 3 illustr, 7 ref.
A *Sk*

Drilling, reaming, tapping titanium
Titanium Metals Corp of America. *Tool Engr* 1960 Vol 45 (2) p 83-84 (Aug)

4 tables.
D *Bfn Ceq*

Fast machining of spindles
Machine Tool Research Institute, Moscow. *New Scientist* 1960 Vol 8 (197) p 524 (Aug 25)

Time for machining spindles has been reduced to less than a quarter by using a block of tangential turning tools, which form an enveloping tool box called a spiral internal contact broach. The component is made to rotate quickly around its axis while the tool box rotates slowly. In the time that one tool is working, the box turns around its axis through the contact angle.
D *Agp Ceqb Pd*

Smith's automatic transmission
Anon. *Auto Engr* 1960 Vol 50 (5) pp 191-198 (May)

For the rotating elements of this unit, close dimensional tolerences must be held and a high degree of surface finish is needed. The various machining processes are described. Rough and finish machining is done on a battery of Mueller PF 350 multi-tool and copying face turning lathes. All cutting tools except the core drill are carbide-tipped. Herbert Microbore tools with the new hard grade of A.C. carbide are used for boring operations. A section deals with numerous small components. 19 illustr.
D *Ceg Pdcb/Cfd Plk Rg/Chm Pr*

High speed gear cutting with carbide tipped hobs
Yu. G. Proskuryakov, N. K. Bezzubenko, B. Ya. Verkhoturov. *Machines & Tooling* 1960 Vol 31 (4) pp 19-23 (Apr) (Original in Russian)

8 illustr, 4 ref.
D *Ad Ceg Pdcb*

Apparatus for drilling two small holes close together. Dispositif servant à percer deux petits trous rapprochés.
E. Jones. *Mach Mod* 1960 Vol 54 (616) pp 33-34 (July) (In French)

1 illustr.
A *Pl*

Calculating life of milling cutters
C. A. Hadley. *Tool Engr* 1960 Vol 45 (1) pp 85-86 (July)

1 illustr, 2 ref, 1 table.
D *Cfj Pd Uqe Vf*

Standard machine heads and tracer control show trend in transfers

D. Ward. *Mach Tool Blue Bk* 1960 Vol 55 (7) pp 130-135 (July)

The receiver of the new Springfield M-14 automatic rifle requires a total of 110 operations, including hand work and finishing. Machining operations include vertical and horizontal milling, angular milling, undercutting, drilling, profiling, and duplicating. Of these, 32 operations are now performed on two transfer machines built for the Winchester Western Div of Olin-Mathieson Chemical Corp by the George Gorton Machine Co. A unique feature of the new development is that every one of the 32 stations consists of a standard head unit, any of which could be replaced or re-located for other purposes, and every station is a unit in itself. 6 illustr.

D *Az Ceq Prz*

Turret lathe contouring of parts for rocket engines

C. H. Wick. *Machinery, NY* 1960 Vol 66 (11) pp 116-122 (July)

A description is given of how aluminium extrusions and forgings can be quickly contour turned and bored on turret lathes with hydraulic tracers. These versatile machines are said to be easily re-tooled to handle different parts or components of modified design. 10 illustr. *L* *Ceqbz Pr*

Modern Raytheon techniques provide . . . eyes for the Hawk

R. H. Spiotta. *Machinery, NY* 1960 Vol 66 (10) pp 122-131 (June)

Deals with some of the processes used in manufacturing the airborne radar unit of the Hawk missile. Parts range from laminated glass fibre to aluminium and magnesium forgings. 20 illustr.

D *Az Ceq*

How to tap machinable carbides

E. Wojtowicz. *Mod Mach Shop* 1960 Vol 33 (2) pp 162-164 (July)

To solve the problem of tap breakage, a method of tapping small threads in machinable carbides is outlined. The method is said to work well on Ferro-Tic C machinable carbides and possibly on other materials. Most of the crowns on each flute should be ground off; the hole must be drilled slightly oversize; a plug tap, not a starter tap should be used; and a viscous sulphur-base cutting compound should be used for the operation. 1 illustr. *L* *Bk Cz.1456*

Machining metals at ultra-high speeds

Anon. *Engineering, Lond* 1960 Vol 189 (4907) pp 622-623 (May 6)

Experiments were done with specially built apparatus and workpieces consisting of projectiles of special design propelled with standard 20 mm hand-loaded cartridges, in which speeds from 15,000 to 250,000 surface ft/min were obtained. Various materials were tested, the tools being of high speed steel. Chips and machined workpieces as well as used tools were examined. Results are given. 4 illustr.

A *Bf Ceq Pdb*

Continuous numerical control of machine tools [Pt II]

P. S. T. Buckerfield, (Associated Electrical Industries Ltd). *Control* 1960 Vol 3 (25) pp 88-91 (July)

A detailed description of the measuring system, and an account of the principles used in the control equipment.

See also *Industr Diam Abstr* 1960 Vol 17 p A225 (Sep). 4 illustr. *D* *Pr Wpb*

Checking of mass-produced parts with pneumatically controlled measuring apparatus. Kontrolle von Massenteilen mit pneumatisch arbeitenden Messgeraeten

A. Wiemer. *Feingeraetetechnik* 1960 Vol 9 (7) pp 322-327 (July) (In German)

The methods of using the instruments and calculating average values by these means are described. Applications include precision testing of machined parts, the measurement of diameter and the form testing of drilled holes, and the testing of oscillating shafts. 16 illustr, 2 ref. *A* *Wb*

Band sawing titanium and titanium alloys

C. T. Olofson. *Light Metal Age* 1960 pp 18, 20-22, 30 (Feb); *Pera Bull* 1960 Vol 13 (6) p 151 (June)

Presents comprehensive data on cutting speeds, feeds, tooth shapes, et cetera.

X *Bfn Cej/Bfxm Cej*

Stainless steel looks to the future

Anon. *Metalworking Prod* 1960 Vol 104 (23) pp 57-60 (June 8)

Includes a brief section on cutting stainless steel. 5 illustr. *D* *Bfdb Ceg*

How zirconium is worked

Anon. *Metalworking Prod* 1960 Vol 104 (26) pp 109-110 (June 29)

Metal cutting techniques are described: slow speeds, heavy feeds and a substantial flood of coolant are necessary for all types of operation on zirconium and its alloys. In grinding, silicon carbide wheels have shown the best form holding properties in surface grinding. 2 illustr.

D *Bfu Ceg/Bfu Chcm Pe Rgc*

Machining of cobalt-containing alloys

C. T. Olofson, F. R. Morral. *Cobalt* 1959 (5) pp 15-25 (Dec); *Battelle Tech Rev* 1960 Vol 9 (6) p 22 (June)

Although commonly so regarded, these alloys are not necessarily difficult to machine if appropriate techniques are used. In general, high quality machine tools, sharp cutting tools of appropriate designs and materials, low speeds and feeds, a continuous cutting action, and intimate cooling by appropriate cutting fluids enable successful machining. *D* *Bfxz Ceq*

Machinability study of ceramic tools : IV, Performance of ceramic and carbide tools in cutting alloyed cast iron at ultrahigh speed

K. Yamada, N. Nakayama, H. Kajihara, S. Sakai, H. Mii. *Nagoya Kogyo Gijutsu Shikensho Hokoku* 1960 Vol 9 (3) pp 1-7; *J Amer ceram Soc* 1960 Vol 43 (7) p 153 (July)

D *Pdc Uqe*Pdd Uqe*

Cooling cutting tools with atomized emulsions or oils

F. B. Malev, D. N. Troitzkaya. *Vest Mash* 1960 (6) pp 67-71 (June); *Engrs' Dig* 1960 Vol 21 (8) pp 87-88 (Aug) 3 illustr. *D* *Pd Qs*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 55s 0d, post free.

Applying the right tools for metal removal

Anon. *Mill Fact* 1960 pp 116-119 (Apr); *Pera Bull* 1960 Vol 13 (6) p 149 (June)

Presents an outline of present methods of metal removal. *X* *Bf Ceq Pd*

Economics of gun drilling

H. C. Gunetti. *West Mach* 1960 pp 52-53 (Feb); *Pera Bull* 1960 Vol 13 (6) p 150 (June)

D *Cfbn*

Applications of recommended point shapes for drilling cast iron

Production Engng Research Assoc, Melton Mowbray, Leics. *Pera Rep* No 72 1960 16 pp (Mar)

10 illustr, 1 ref. *D* *Bfca Cfb Pl.254*

Centering gage for cutting tool

Tru-Center Products Co, Decatur, Ill. *Machinery, NY* 1960 Vol 66 (10) p 212 (June)

A fast and very accurate method of setting lathe-type cutting tools to the work centre line is said to be made possible by a Tru-Center gauge, the body of which is attached to the cylindrical workpiece by ceramic magnets. If the workpiece is non-magnetic, a rubber band is used. Accuracy can be measured in increments of 0.001 inch. Uses include right-angle measuring and levelling. 1 illustr. *D* *Pd Wbb*

Vertical turret lathes equipped with 'Size-Au-Trol'

Bullard Co, Bridgeport, Conn. *Machinery, NY* 1960 Vol 66 (10) pp 214, 218 (June)

'Size-Au-Trol', a new concept in machine tool control, is being incorporated as a standard feature in all Bullard 'Dynatrol' vertical turret lathes. This control is designed to bring the cutting heads automatically to a stop when they reach pre-set positions during each successive stage of the machining operation, thus relieving the operator of responsibility for sizing the work. 2 illustr. *D* *Ceqb Pr Wp*

Fosdick precision boring machines with numerical depth control

Fosdick Machine Tool Co, Cincinnati, Ohio. *Machinery, NY* 1960 Vol 66 (10) pp 226, 228 (June)

Numerical depth control is the most recent optional feature available on Models 44 and 54 Fosmatic precision boring machines, complementing Fosmatic numerical positioning and thus increasing the versatility of these machines. The models will be used especially for small-lot boring jobs requiring accuracy to ±0:0001 inch. The depth control system is explained. 1 illustr. *D* *Cfdb Pr Wpb*

Carbide center drill countersink

Dixie Tool Industries Inc, 4555 W Franklin Ave, Bridgeport, Mich. *Mod Mach Shop* 1960 Vol 33 (2) p 277 (July)

A solid carbide combined centre drill and countersink is said to be suitable for use on extremely hard metals and for highly abrasive applications, where other tools are not satisfactory on a long production run. The tool has a double end and is available in six different sizes. 1 illustr. *L* *Plj Plz*

Japanese machine tool factories

R. E. Green. *Machinery, Lond* 1960 Vol 97 (2491) pp 304-312 (Aug 10)

A survey of activities at the Ikegai Iron Works Ltd, Tokyo. The smaller lathes described include a precision lathe suitable for use with diamond tools for fine turning and facing operations. 9 illustr. *D* *Ceqbb Nf Pr/Pr.263.373*

Combined boring and facing heads

Chandler Tool Co, Muncie, Ind. *Mod Mach Shop* 1960 Vol 33 (2) p 281 (July)

The 1960 models of Chandler Duplex combined boring and facing tool heads have several improvements, including a new method of attaching the shanks to the body, said to preclude all chance of looseness or breakage between body and shank. A decrease in the overall height of the body minimizes any tendency towards weakness or chatter. A new method also enables the operator to keep the tool in perfect adjustment at all times, it is claimed. 1 illustr. *L* *Plk*

Spray-rite system for cooling and lubricating cutting tools

Oil-Rite Corp, Manitowoc, Wisc. *Machinery, NY* 1960 Vol 66 (11) p 228 (July)

1 illustr. *L* *Pd Qr/Pd Qs*

Portable air drills

Thomas C. Wilson Inc, 21-11 Forty-Fourth Ave, Long Island City 1, NY. *Mod Mach Shop* 1960 Vol 33 (2) pp 218-219 (July)

Series 93 have a drilling capacity up to ½ in. and a choice of seven speeds, ranging from 500 to 15,000 rev/minute. Steel, cast iron, plastics, *etc* can be handled. Features include built-in lubricators and hardened, ground, and honed cylinders. 1 illustr. *L* *Pl*

New plant and tools

Anon. *Auto Engr* 1960 Vol 50 (2) pp 72-75 (Feb)

Marcol standard push broaches are made to precision tolerances from 18% tungsten HSS and are designed to replace reaming or fine boring of close-tolerance holes on a production basis. The broaches range from 3/16 to 1 in. in 19 in. diameters and are produced to order.

The Milman multiple-pitch, high speed automatic tapping machine is for through or blind-hole tapping of high accuracy in small or precision components. 8 illustr. *L* *Cfm Pr/Cz Prs*

Pneumatically-operated toggle clamps speed tube-drilling operation

Schieber Mfg Co, Detroit, Mich. *Mod Mach Shop* 1960 Vol 33 (2) pp 153-154 (July)

The drilling of two holes in opposite ends of long link-rods can be done in one operation, when two De-Sta-Co Series 810 pneumatically controlled clamps are used in building a fixture in which the clamping action is an integral part of the machining cycle. 1 illustr. *L* *Cfb Pz*

Tool room borer

H. W. Kearns & Co Ltd, Broadheath, Nr Manchester. *Mech World* 1960 Vol 140 (3492) p 306 (July)

The S type Optimetric horizontal toolroom boring machine is intended for dealing with components of approximately 1 ft cube requiring holes to a high degree of finish and accuracy between the centres and in the bore. The spindle is mounted on precision ball and roller bearings. The stepless feed unit makes it possible to use the machine for fine boring operations by combining low feed rate with high spindle speed. A patented optical system is fitted to the vertical adjustment of the spindle slide and transverse movement of the tables. It uses a finely divided scale engraved on glass and projected onto a large screen with a vernier giving direct readings to 0.001 in. to a limit of error of ±0.00025 in., or to 0.01 mm within 0.005 millimetre. 1 illustr. *L* *Cfdb Pr Psz*

Diamond tool lathe produces surface finishes to less than 1 micro-inch

Milo Manufacturing Co, 259 Broad St, Elizabeth, NJ. *Carbide Engng* 1960 Vol 12 (6) p 58 (June)

A larger size Bryant-Symons 'Super-Finishing' diamond tool lathe is capable of turning components with 13¼ in. diameter and 12 in. long, facing 21 in. diameter and 12 in. wide, and takes 27 in. between centres. Like the standard 8 in. model, this machine is specifically designed to turn surfaces to the highest possible finish: super finishes of less than 1 micro-in. can be produced, it is claimed. Other features are dimensional accuracy, surface flatness, and correctness of cylinder form. The lathe is intended for non-ferrous metal but can be used for other metals, while diamond tools can be replaced by ceramic or carbide tools. Spindle speeds range from 300 to 1,200 rev/min with automatic feeds 0.0005 in. to 0.0025 in./revolution. 1 illustr.

D *Bf Ceqb Nf Pr*

Machines and equipment shown at Pratt & Whitney centennial celebration

Pratt & Whitney Co Inc, West Hartford, Conn. *Machinery, NY* 1960 Vol 66 (11) pp 164-167 (July)

Among the new machines displayed was a numerical head jig borer which becomes capable of doing an entire series of precision machining operations automatically when numerical control is extended to the operation of the spindle. It has the Electrolimit measuring system which can locate work accurately to 0.0001 inch. The SIM 10-in. production lathe has a 71/2 h.p. motor, and is said to produce toolroom accuracy and extremely fine finishes. The Potter & Johnston 3E-15 automatic turret lathe is designed for fast metal removal of the toughest super-alloys and to give an excellent finish and high accuracy. 5 illustr.

L *Az Cfd Pr.27*

Tools at work [:] Gang drilling

Librascope Div, General Precision Inc. *Tool Engr* 1960 Vol 45 (1) p 72 (July)

Gang drilling of five circuit boards is done with a special drilling machine. Boards are placed in a positioning fixture which has the drilling pattern etched into the metal surface. The positioning finger is guided along the pattern by the operator. As the finger drops into each indentation in turn, the operator touches a toe switch and a carbide drill located below the table automatically drills the holes. 1 illustr.

D *Cfbz Pr*

Precision-boring tool-holders

MBI Export & Import Ltd, Bronx, NY. *Machinery, NY* 1960 Vol 66 (10) p 280 (June)

A complete line of Kaiser adjustable precision tool holders, especially designed for jig borers and horizontal boring machines, have high cutting capacities and are equipped with vernier scales and interchangeable shanks. Tool bits are advanced radially. 1 illustr.

D *Cfdb Pr Psp*

Ingersoll-Rand mechanical feed drill

Ingersoll-Rand Co, New York City. *Machinery, NY* 1960 Vol 66 (11) p 209 (July)

These drills are designed to produce clean, precisely located holes, even when drilling at angles. The company claims that holes drilled with the tools seldom require reaming. There is no plunging when the drill breaks through and the burr left at the edge of the holes is decreased by the constant feed. The drills have a wide range of feed and speed adjustments. Specifications are given. 1 illustr.

L *Pl*

Lindner LB12 optical jig borer

Stedall Machine Tool Co, London N 1. *Metalworking Prod* 1960 Vol 104 (25) pp 248-249 (June 22)

The machine is designed not only for small jigs and fixture work, but also for small batch production of machine components, since it can be used both as a metal cutting and a precise measuring machine. Heavier boring and facing as well as milling jobs can be done without loss of accuracy, it is claimed. The optical measuring system is a precision cylindrical measuring scale which can be turned but is without movement in the axial direction. One scale is incorporated into each co-ordinate table. Each scale is mirror finished and diamond-scribed with a thin continuous helical line of high pitch accuracy to divide the scale. By turning the scale, the division can be set in increments of 0.0001 in. to an accuracy of 0.00004 inch.

D *Az Cfd Pr.27/Az Cp Nc.27*

[Automatic drilling machine]

James Archdale & Co Ltd. *Engrs' Dig* 1960 Vol 21 (7) pp 101, 103 (July)

Of interest among the company's exhibits at Olympia was the Autonomic machine tool control system which utilizes punched tape. The Archdale Autonomic 6 ft × 6 ft vertical co-ordinate drilling machine is an example of the application of this system, the machine programme including drilling, reaming, tapping and spot-facing, in conjunction with co-ordinate positioning and automatic speed, feed, and tool change. Drilling capacity is up to 1¼ in. diameter in mild steel. The control system is described. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A222 (Sep).

D *Cfb Pr Wpb.27*

Diamond tool easy to set

Staset Co Inc, W Orange, NJ. *Purchasing Week* 1960 Vol 3 (28) p 26 (July 11)

The operator can rotate this diamond dressing tool up to 360° to maintain maximum accuracy. The diamond can be turned without upsetting the original tool setting and while the machine is operating. 1 illustr.

D *Nj*

Lathe with constant surface-cutting-speed mechanism

Monarch Machine Tool Co, Sydney, Ohio. *Engrs' Dig* 1960 Vol 21 (6) p 161 (June)

A new type of constant surface-cutting-speed mechanism has recently been developed for the Mona-Matic manufacturing lathe. Functioning in conjunction with a four-cut fully automatic work cycle, the mechanism provides automatic variation of the speed of the drive motor to maintain the desired surface cutting speed on the various diameters and contours of each workpiece in the run. It is claimed that this new speed-control feature gives greatly increased tool life, higher rates of production, and improved workpiece finish. 1 illustr.

D *Ceqb Pr Uqfb Wp*

Spacematic 1520 jig borer with Airmec equipment

Newall Engineering Co Ltd, High Street, Old Fletton, Peterborough. *Metalworking Prod* 1960 Vol 104 (26) p 113 (June 29)

As well as having the Newall patented roller measuring system which enables table settings to be made direct to 0.00005 in., the machine is equipped with a separate automatic positioning system. The Airmec Autoset system gives improved production times when an overall accuracy of 0.0005 in. is adequate. The two measuring systems can be used in conjunction in cases when in one component a few holes may be closely toleranced for spacing, whereas the rest are less critical. The operation of the Airmec system is explained. 1 illustr.

D *Az Cfd Pr.27*

Optical Projector attaches to any lathe

Stocker & Yale Inc, 50 Green St, Marblehead, Mass. *Mod Mach Shop* 1960 Vol 33 (3) pp 237-238 (Aug)

Describes Model 7M Optical Projector which allows continuous and precise magnification for checking, direct measurement and comparison of work in progress to transparent overlay charts. A selection of magnifications from 10× to 100× are standard and interchangeable. 1 illustr. *D Wcg*

Pioneer machine processes fifty-four different parts

Pioneer Tool & Engineering Co, Chicago, Ill. *Machinery, NY* 1960 Vol 66 (10) p 278 (June)

An in-line transfer machine will drill, tap, counterbore, spot-face, ream, line-ream, and probe all critical holes in a carburettor body. Finger-tip control permits the machine to process completely 54 different bodies at a rate of 200/h, while minimum set-up time is needed and dis-assembly to accept new stations is said to be easy. *D Az Ceq Pr*

Measuring equipment

Coventry Gauge & Tool Co Ltd. *Mach Shop Mag* 1960 Vol 21 (6) pp 390-391 (June)

A wide range of Matrix precision measuring equipment is reviewed, including an optical comparator for checking the points of twist drills. The drill is placed on a V-block and the shadow of its point is shown on a screen, at a magnification of ×5 or ×10 according to the model, where it can be compared with lines engraved on the screen. Three models of the instrument are available. 4 illustr.
D Pl Vfdz Wc.27

Precision boring machine for processing air-cooled engine crankcases

Ex-Cell-O Corp, Detroit, Mich. *Machinery, NY* 1960 Vol 66 (11) pp 180, 182 (July)

This two-way precision boring machine performs critical machining operations consisting of precision boring crankshaft and camshaft bearing holes. Tolerance of hole diameter is held within 0.0005 in. for camshaft holes and 0.0003 in. for crankshaft holes. 1 illustr. *L Cfdb Pr*

CUTTING AND MACHINING OF STONE, GLASS, ETC.

Methods of reducing the energy dissipated in the surface layers of quartz

A. G. Smagin. *Sov Phys, Crystallogr* 1960 Vol 4 (6) pp 818-821 (June) (Original in Russian)

The methods involve grinding the crystals with abrasives used in an appropriate sequence. Diamond sawing leaves scratches on the surface of the blank which may be as deep as 0.023 cm, and these scratches are accompanied by large shear distortions which may go much deeper. Grinding must remove the scratches and the deformed layer, but any grinding paste itself produces scratches of a size comparable with the size of its particles. Each successive grinding removes the surface damage caused by the previous grinding, and the crystal is finally polished until the asymptotic value of Q is attained. The methods are described and conclusions recorded. 5 illustr, 4 ref.
D Bcb Cej Ng Unf/Bcb Chm Unf

Gyroscopic grinding set-up

J. B. Popper. *Machinery, Lond* 1960 Vol 97 (2488) pp 172-173 (July 20)

An interesting application of gyroscopic precession is used in grinding diamond gramophone needles. Little manual control is needed and similar set-ups could be used for operations on other workpieces to produce rounded ends. The arrangement, which resembles a toy gyroscopic top, incorporates a flywheel on a shaft that is rotated at high speed, and allowed to precess around a given point. If, while the shaft is revolving, an object with an arbitrary profile is positioned along the precession axis and brought into contact with the precessing end of the shaft, the shaft will follow and press against the surface of the object. A diagram shows the set-up as utilized for grinding a diamond needle and indicates how gyroscopic precession causes the rotating diamond to press against and travel around the rotating conical grinding wheel. The actual set-up was designed for grinding a diamond point radius of 0.0008 inch. 2 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A189 (July). *D Ne:Hnz*

Machining Nimonic and graphite on Denham lathes

Denham's Engineering Co Ltd, Holmfield, Halifax. *Machinery, Lond* 1960 Vol 97 (2488) pp 145-147 (July 20)

4 illustr.
D Bfu Ceqb Pr/Bhb Ceqb Pr

Ten micro-inch tracing at constant surface speed

Overmyer Mould Co, Winchester, Ind. *Mod Mach Shop* 1960 Vol 33 (3) pp 142, 144 (Aug)

Manufacturers of glass bottle moulds use very hard materials that can resist chemical attack in the bottle-blowing process, but which also resist cutting action of machine tools. Various attempted remedies for this problem are discussed. The solution adopted by the Overmyer Co for turning 'Colmoloy' coated plungers is the use of 15 in. LeBlond Dual-Drive Lathes, equipped with LeBlond tracers and constant surface speed control. The plungers are turned to a 8-12 micro-in. finish, *ie* fine enough to use as machined. 3 illustr.
D Az Ba Ceqb Unf

Utrecht Spring Fair

Anon. *Industr Diam Rev* 1960 Vol 20 (235) p 114 (June)

Only one diamond tool manufacturer, Diamant Boart, SA, Brussels, took the opportunity of illustrating the use of diamond saws and drills for working of stone and other building materials at this Fair, which was mainly concerned with building and civil engineering. Machines for glass working made by Autoflow Engineering Co Ltd of Rugby were also on show.
D Bn Cej Ng.27/Bn Cfb Nh.27

Supersonic dental device UZZ 2

St. Svehla. *Jemna Mechanika a Optika* 1960 (7) pp 216-219 (July) (In Czech, abstr in English)

Design and advantages of a new supersonic dental device are described. 5 illustr, 3 tables, 11 ref.
D Bw Ceqr Psc

USP 2,911,773 (June 18, 1957) **A. R. Gobat, International Telephone and Telegraph Corp**

Method of cutting semiconductive material

The usual procedure of slicing a block of germanium or silicon into slabs and then cutting the slabs into bars or dice requires complicated mounting arrangements and causes large waste of material. In the new method, spaced cuts of parallel planes are made through one surface of the block, preferably at an angle of 45 degrees. Then a second series of such cuts is made so

as to obtain two series of intersecting planes perpendicular to each other. The separated pieces are progressively removed. There may be further cuts, in planes mutually perpendicular to the first series of planes, to divide the block into dice. The cuts may be made by diamond disks, or by ultrasonic machining using a slurry of abrasive grit such as diamond dust, boron or silicon carbide, or aluminium oxide. (11 claims, 5 illustr). Ref cited : 5 USP ; 1 BP.
J *Bfr Ceg Ngd.545/Bfr Ceqr Km.545/ Bhc Ceg Ngd.545/Bhc Ceqr Km.545*

USP 2,912,968 **A. Stihl**
(Oct 24, 1955—conv date, Germany)
Power saw chain for use on hard rock

The saw chain, of which a link is shown in Fig 6, is not provided with conventional saw teeth but with grinding heads 6 which have surfaces coated with diamond chips. Other forms of links are represented in Fig 7-10. The mobility of the chain members insures that, during every revolution of the chain, any particular part of the groove cut by the chain in the rock is contacted by constantly changing diamonds.

Fig 6 (left) and 7 to 10 (below). Various forms of links with diamond coated grinding tips. USP 2,912,968.

The chain acts in the manner of a file where after every stroke the direction of filing is deliberately altered slightly. The groove is somewhat wider than the chain width. The speed of the chain may be as great as 20 to 40 m/second. Fine diamond grains are used in a matrix of hard metal, steel, bronze, or plastic. No lubricant is used as is usually customary with motor driven chain saws, but very considerable quantities of flushing water are supplied through the guide rail. (12 claims, 20 illustr). Ref cited : 7 USP ; 1 GP.
J *Bn Cej Ngz.545*

USP 2,919,523 (Sep 4, 1951) **W. Phillips, E. H. Phillips, E. D. Phillips, J. B. Phillips**
Ophthalmic lenses and process and apparatus for producing the same

The process refers to the production of a lens embodying an upper arcuate distance field, a lower arcuate near vision field, and triangular intermediate fields, the apices of which lie on the line of juncture between the upper and lower fields, with an inclined ledge, the face of which is directed towards the upper distance field and only extends along the juncture between the apices of the triangular, spaced, intermediate fields. A plurality of these multi-focal lenses, *ie* eight or more, will be produced from solid homogeneous blanks simultaneously in a succession of correlated grinding and polishing stages by cup-shaped grinding tools for successive application to the blanks, while the same are simultaneously rotated relatively to the tools. The three vision fields are first generated by diamond grinding, the upper arcuate vision field being polished before generating the two other fields which are then polished, the reading field first, before cutting to shape. (5 claims, 33 illustr). Ref cited : 9 USP.
J *Bm Chc Tfb.545*

USP 2,917,873 (July 23, 1958) **P. D. Jewett, Transitron Electronic Corp**
Machine for cutting germanium silicon quartz and other hard materials

The machine has an automatic system for lowering in automatic increments the cutting tool, *eg* a rotary blade with a diamond edge, while the horizontal table underneath reciprocates. The downward movement of the cutting tool is controlled by a lead screw rotated through a linkage including a magnetic clutch from a power source. The movement is limited by an electric switch in series with the circuitry of the magnetic clutch. The switch is triggered after the lead screw has rotated a selected distance. The cutting blade is moved upon each traverse of the table on return into starting position. (3 claims, 3 illustr). Ref cited : 7 USP.
J *Az Ba Ceg Ng.545*

FP 1,196,676 (June 5, 1958) **I. F. Lundquist, Hyresgaesternas Sparkasse-och Byggnadsfoereningars Riksfoerbund UPA**
Method and machine for sawing stone. Procédé et machine pour le sciage de la pierre

The block of marble 20 shown in Fig 11 and 12 rests on rollers 21 to be sawn into slabs of narrow width by saw blades 4, in a frame in pivoted guides 5 for vertically parallel reciprocation linked by connecting rod 7 to crank 8 on shaft 10, driven through motor 13 and linked to eccentrics 16, 17 by links 18, 19. The

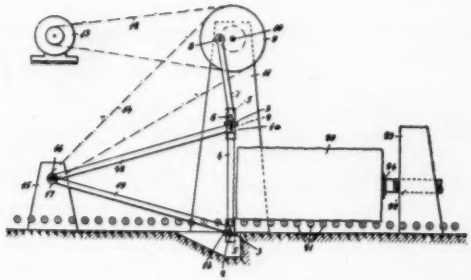
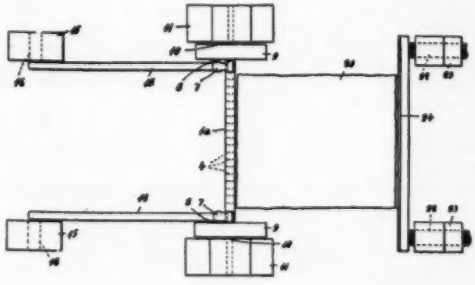


Fig 11 (above) and 12. Two views of the method in operation. FP 1,196,676.



eccentrics are so arranged that the saw blades describe a closed flat curve, exerting sawing pressure on the block when moving in one direction and no pressure when moving in the other direction. The block is fed towards the frame saw, *eg* by feed screw 22. The saw blades may be provided with hard cutting teeth or with diamonds. (2 claims, 3 illustr).
J *Bn Ceg Pr.545*

FP 1,195,684 **NV Philips' Gloeilampenfabrieken**
(Dec 24, 1957—conv date, Netherlands)

Circular saw. Scie circulaire

Certain saws with diamond grains embedded in a bond and covering the saw faces up to a certain height are used for severing rods or tubes of hard material, particularly of glass. Such saws permit rapid and accurate work but become clogged very quickly, which accelerates their wear and reduces the accuracy of the cut. It has been found that the cutting faces can be kept clean by providing them with a number of small cavities irregularly distributed and preferably conical with an angle of 60 degrees. About 15 cavities are made per sq. cm. having a depth of 0.2 mm in a disk of 200 mm maximum diameter, of a thickness of 11 mm maximum at the cutting faces. A comparison between two wheels, one without and one with cavities, had the following result: 8,000 cuts/h through glass tubes during 40 h with 10% rejects, against 12,000 cuts/h during 60 h with less than 1% rejects. (6 claims, 4 illustr). *J* *Pcz.545*

GEM POLISHING

Swiss P 341,674 **J. Sigaar**
(Dec 21, 1955—conv date, France)

Precious stone. Pierre précieuse

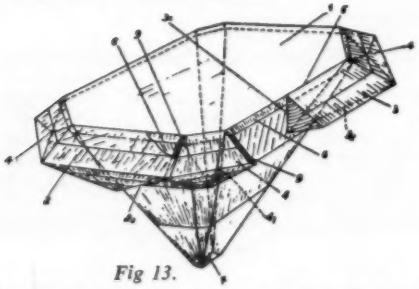


Fig 13.

As shown in Fig 13, a large stone such as a diamond is imitated by an assembly of small stones around a central stone. The small stones consist of four lateral stones of two different shapes 2 and 3, and four corner stones of equal shape 4. The stones are assembled without bonding in a conventional setting. The appearance of the stone is that of an 'emerald cut' stone. (4 claims, 4 illustr).
J *F Kbf.545*

ROCK DRILLING

4¾-inch diamond drill holes applied to underground blasting

J. A. Patterson. *Canad Min J* 1960 Vol 81 pp 50-51 (Jan); *IMM Abstr* 1960 Vol 10 (5) p 167 (June-July)

The object of this paper is to describe briefly the use of 4¾ in. diamond drill holes for blasting large pillars. The drilling of these holes is known to be satisfactory for pillar recovery in large sulphide ore bodies.
X *Cfb Nh*

Large diamond drill holes

Anon. *Diamond News* 1960 Vol 23 (9) p 15 (June)

Diamond drill holes of 4¾ in. diameter are being used in North American mines for blasting large pillars. Previously large holes were made by drilling and then reaming to size. A one-pass diamond tool consisting of an AX non-coring bit with pilot adaptor and a tapered reaming sheel of 4¾ in. diameter is now used with great efficiency. *D* *Cfb Nh.341*

Recent developments in diamond bit design for air and gas drilling

W. L. Harris, G. Jackson. *Canad Min J* 1959 Vol 80 pp 53-57 (Dec); *IMM Abstr* 1960 Vol 10 (5) p 168 (June-July)

During the past four years a great deal has been written concerning the results of the use of air and gas as a circulating medium in oil and gas wells. The majority of these articles have dealt with the operations carried on with conventional equipment, with only occasional references being made to the use of diamond set core bits and drilling bits while air drilling. The purpose of this paper is to bring the reader up-to-date on what has been done with diamond bits and to point out in a general manner how the bit design and barrel construction can be altered for air drilling.
X *Cfb Nhb.132*

Current oil industry fishing techniques and tools. 1. Cased hole

W. Medders, D. U. Skinner. *World Oil* 1960 Vol 151 (2) pp 47-72 (Aug 1)

The first of a series, this part deals with cased hole fishing operations, describing methods and equipment used to recover fish, and also all types of drilling in soft hard rock and their allied fishing characteristics. Diamond bits were used in some of the techniques explained. 34 illustr. *D* *Bn Cfb Nhb*

Methods and techniques used in prospecting and research. Méthodes et techniques de prospection et de recherche

Ja. N. Zagibalov. *Prospection et Protection du Sous-sol* 1959 (9) 8-13 (Sep) (In French, original in Russian)

Core sampling is widely used in prospecting for mica deposits. Diamond drilling is recommended as a means of minimizing damage to the drill-core and the mica. 3 illustr, 2 tables. *K* *Cfb Nh.12*

Visual survey of bore-holes

L. Walter. *Min Mag, Lond* 1960 Vol 103 (1) pp 23-25 (July)

The demand for equipment enabling visual inspection of bore-holes is expected to increase. A Mueller-Grundig unit, the type B.300 optical bore-hole instrument, is claimed to be of great potential value in making geological soundings of drill holes, *etc*, and for general geological exploration work. The equipment is said to be suitable for establishing rock types and other facts, while in drilling operations it gives information regarding core losses. The standard unit will reach a depth of 1,300 ft, making it possible to view directly with stereoscopic vision, while photographs may be taken from the monitor screen. The equipment is described and specifications given. 3 illustr.
D *Cfb Qd Wc*

LITERATURE REQUESTS
Please quote the page number of the journal which contains the original reference, and the author and title of the article, in all cases.

Drilling fluids : a current review. II

G. K. Jones. *Petroleum* 1960 Vol 23 pp 101-104 (Mar) ; *Battelle Tech Rev—Abstr* 1960 Vol 9 (6) p 351a (June) (No 6776)

Examples of specialized fluids are given together with an account of field testing procedures.

X *Sjc*

Timken removable rock bit line has bit for every job

Anon. *Timken* 1960 Vol 1 (6) 40 pp (June)

Timken Co make two rock bit types, carbide insert and all-steel multiple-use bits, in a wide range of shapes and sizes. Various varieties are illustrated. 7 illustr.

D *Bn Cfb Pl*

USP 2,911,192 (Apr 3, 1957) **F. G. Boucher, Jersey Production Research Co**

Vibratory rotary drilling method and apparatus

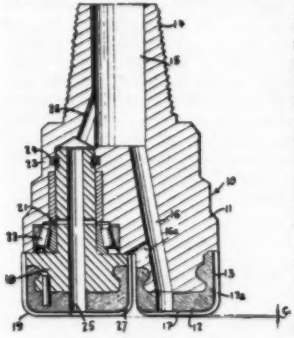
The drill is oscillated longitudinally and torsionally with the same frequency. The phase relation between the longitudinal and torsional oscillations is varied so as to obtain the best drilling results in different rock formations. It is preferable to impart to the drill a continuous rotational movement in one direction for a progressive rotational advance, which is referred to as 'indexing' between successive impacts. The following ranges of operating conditions appear to be suitable for various types of rock formations : (*i*) phase angles : 60° lead to 240° lag (with reference to vertical) ; (*ii*) vibrational frequency : 10 c/s to 600 c/second ; (*iii*) vibrational amplitudes : 0.01 in. to 0.50 inch ; and (*iv*) rotational speeds : 20 rev/min to 400 rev/minute. (17 claims, 5 illustr). Ref cited : 5 USP.

J *Chc Pr Qn.545*

USP 2,911,196 (May 3, 1957) **H. M. Cameron, B. K. Haffner, American Coldset Corp**

Diamond drill bit

The main drill bit carries a rotable auxiliary drill bit in a recess overlapping the geometric centre of the main drill: Fig 14 and 15 show the drill bit in cross section and in a view from below. The main bit 11 is crescent-shaped with diamonds embedded in matrix portions 12, 13. Water passage 15 leads to passage 16 in the main bit and through passage 26 to auxiliary bit 18 with central water passage 25. The auxiliary bit 18 with diamonds embedded in matrix 19 is rotatable in bearing 22 and kept in position by split ring 23 in the main body of bit 11. The frictional forces acting on the auxiliary bit 18 rotate this bit in the opposite direction to the rotation of the main drill. (1 claim, 2 illustr). Ref cited : 4 USP.



J *Nhb.545*

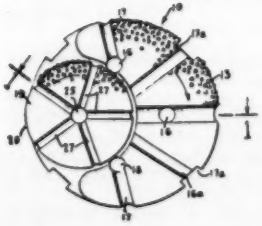


Fig 14 (above). The drill bit in cross section.

Fig 15. The bit seen from below. USP 2,911,196.

USP 2,913,236 (Aug 25, 1954) **W. J. Kehaly**

Tunnelling machine having a rotary cutting ring

The machine is intended to bore a clean-walled circular tunnel through earth, rock, or even bedrock. The boring device is a ring rotating about the front of the machine which cuts, rather than chips or chatters, the rock formation through which it passes. The cutting elements may be diamond teeth arranged, as in Fig 16, with diamonds 121 embedded in blocks 119 in ring 106 rotated while the machine is driven forwardly. (11 claims, 18 illustr). Ref cited : 17 USP.

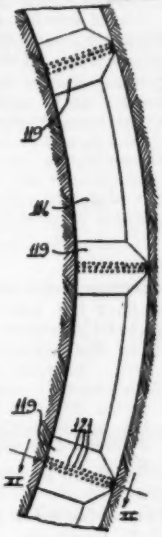


Fig 16. Diagram showing the cutting elements with diamonds 121 embedded in blocks 119. USP 2,913,236.

J *Bn Cegz Nhz Pr.545*

USP 2,914,305 (Sep 28, 1956) **F. W. Wink, Bucyrus-Erie Co**

Lightweight portable diamond drill

The drill is extremely light, weighing only 37 to 50 lb, and is designed for drilling exploration holes through hard rock. It is a rotary core drill with a cutting bit of diamonds set in a matrix. Water is supplied to the hollow drill spindle through a connection which is in the casing at the top of the spindle and is completely sealed from the gears and other working parts of the drill. A centrifugal clutch is arranged between the motor as a safety feature. The casing consists of three parts, the top cover casting being provided with handles and housing the clutch. Core barrel sections are added without having to detach other parts, except the drill bit. The drill may be used up to a depth of more than 125 ft and can take large core samples. No off-set shafts or horizontal drives are needed. (3 claims, 4 illustr). Ref cited : 6 USP ; *Canad Min metall J* 1955. See also : USP 2,842,341.

J *Cfb Nh Prw.545*

USP 2,915,285 (May 23, 1956) **F. H. Deily, Jersey Production Research Co**

Coring subterranean formations

Core samples are of particular importance in oil reservoirs and fields considered for secondary recovery operations. The method used comprises chilling of the core as it is cut to maintain its true fluid content. For this purpose a stream of high pressure air may be used to drive a gas turbine near the bottom of the bore hole, and this turbine drives the coring tool. The stream of high pressure air expands rapidly while passing through the turbine resulting in a sudden and severe temperature reduction utilized for 'freezing' the core. The coring assembly includes outer and inner barrel and coring bit. Diamond bits are entirely suitable. (8 claims, 3 illustr). Ref cited : 8 USP ; 1 GP.

J *Az Cfb Plb.545*

WIRE DRAWING

Important points on the use and maintenance of diamond wire drawing dies

British Diamond Wire Die Co, Parkstone, Dorset. *Indian Wire Industr J* 1960 Vol 3 (5) p 70 (May)

Not only is better quality production obtained by using and maintaining diamond dies correctly, but maintenance costs are thereby considerably reduced. Dies should be removed for inspection regularly and an examination made to determine whether the polish is sufficient or whether the reduction zone, bearing, or exit is damaged. The reconditioning of dies at various stages of wear is described briefly.

D *Nkb.138*

Electronic valve and tube manufacture

Mullard Ltd, Blackburn. *Metallurgia* 1960 Vol 61 (366) pp 153-156 (Apr)

In the manufacture of tungsten and molybdenum wires, tungsten rods are drawn through a series of progressively smaller dies until they have been reduced to the thickness required. Hard metal dies are used in the initial stages, but as the wires become thinner, diamond dies are necessary. 7 illustr.

E *An Bfp Cn Nkb/An Bfq Cn Nkb*

The fundamentals of wire drawing

C. P. Bernhoeft. *Wire Ind* 1960 Vol 27 (319) pp 693, 695-699, 701 (July)

The rules given here, although based on the drawing of aluminium wire, can, under certain conditions, be applied to the drawing of all other metals. 11 tables. (To be cont).

L *Cn*

A preview of some exhibits at the International Machine Tool Exhibition, Olympia, London, June 25 to July 8

Anon. *Wire Ind* 1960 Vol 27 (318) pp 585-589, 591-592 (June)

Exhibits of interest to the wire industry are described, including L. M. Van Moppes diamond products. 11 illustr.

D *Nk.27*

'TURBO' Centrifugal Coolant Cleaners

Anon. *Indian Wire Industr J* 1960 Vol 3 (6) pp 79-80 (June)

E *Sj:Qeb*

Scientists' notebook—Wire temperature measuring device

Anon. *Financial Times* 1960 (22151) p 11 (Aug 3)

A new and more accurate device for measuring wire temperature during drawing is said to enable markedly higher drawing speeds to be achieved than have hitherto been possible. At the same time, the new temperature measuring device enables maximum drawing speeds for various steel qualities to be very quickly established, together with different drafting schedules. It is claimed that, as a result, it can be used to form the basic unit of a future system of automation and process control in wire drawing mills.

D *An Cn Vb Wb*

A wire temperature meter

Addison Electric Co Ltd, 10-12 Bosworth Rd, London W 10. *European Tech Dig* 1960 Vol 5 (8) p 40 (Aug)

In co-operation with BISRA, the manufacturer has developed a meter for measuring the temperatures of moving wires in the control of wire drawing and similar processes.

D *Cn Sl Vb Wb*

GRINDING AND POLISHING OF CARBIDES AND METALS

Surface grinding carbide — man-made and natural diamonds

N. L. Leventhal (GEC). *Carbide Engng* 1960 Vol 12 (6) pp 26-28, 30 (June)

The data presented here is an attempt to provide dependable information for diamond wheel users who are unable to estimate wheel life accurately, and to provide comparative information for those who are able to measure diamond wheel wear against volume of stock removed. Results were obtained in a laboratory but under conditions that might be found in any production shop. Similar wheels using synthetic and natural diamond were tested and results are given. 2 illustr, 5 tables.

D *Nv Uqe.1341*Nvh Uqe.1341*

Super precision and finish with diamond

J. H. Olson (Englehard Hanovia Inc). *Carbide Engng* 1960 Vol 12 (6) pp 36-39 (June)

Describes the increasingly important role of diamond in the range of smaller mesh and micron sizes, used in bonded or non-bonded form, for finish grinding, honing, and lapping. The principal reasons for favouring diamond as an abrasive for finishing operations include the ability to cut cleanly, due to superior sharpness and hardness; better wear; cooler, faster cutting at lower pressures; and the fact that the chemical inertness of diamond prevents bonding between abrasive and work material. 4 tables.

D *Chd Km/Chh Km/Chm Km*

Taking some of the mystery out of carbide tool grinding

R. A. Parke. *Carbide Engng* 1960 Vol 12 (6) pp 22-25 (June)

It is stressed that complete job specifications are needed for a wheel manufacturer to make suitable recommendations of diamond wheel specifications. The factors determining wheel and labour costs are discussed, wear in resinoid, vitrified, and metal bonded wheels being covered separately. Effects of grinding forces on wheel cost, and conditions which result in varying degrees of force are also described. Among improvements in the last 30 years have been improvements in output per unit of time, *eg* higher than usual wheel speeds when using metal bonded wheels are reported to have resulted in greater economy in some cases. It is concluded that diamond supply is sufficient to ensure an increasing number of diamond wheel applications, development work on new compositions, and laboratory testing to speed the promotion of new products. 3 illustr, 3 tables.

D *Bk Chc Nv*

Diamond wheels

Anon. *Mineralogist* 1960 Vol 28 (6, 7, 8) p 136 (June, July, Aug)

Compares use of synthetic and natural diamond wheels for various grinding purposes.

D *Nv*Nvh*

The active control of components on grinding machines by means of radio-isotope indicators

V. V. Kondasevskij. *Vestn Masstro, Moscow* 1960 Vol 40 (1) pp 67-70; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (3) p 228 (Mar) (Original in Russian)

Alterations in the size of the workpiece are reproduced visually during the grinding process by means of a fitted measuring device.

K *Chc Pr Psc Syb*

Coolants for carbide-tool grinding . . . they DO make sense

D. C. Kauffman (Crescent Cutter Co). *Amer Mach* 1960 Vol 104 (11) pp 90-92 (May 30)

The use of good quality and correctly applied coolants has considerably increased the life of diamond grinding wheels, and tools have been ground sharper and to a finer finish. Objections can be overcome: odourless grinding oils are available and smoking can be minimized in many ways. Smoking indicates excessive heat which is harmful to the wheel in any case. Dry grinding may not produce smoke but can produce a cloud of diamond dust that wastes away the wheel. Various considerations that must be taken into account on choosing a coolant are discussed. For much carbide tool grinding, wick application of coolant is the most effective and practical. This application is described. 4 illustr.

L *A Bk Chc Nv Qs Sj*

Suggested lapping techniques

F. M. Ross. *Carbide Engng* 1960 Vol 12 (6) p 39 (June)

Brief instructions on lapping sequences, proper selection of laps and lap materials, with general advice on lapping and how to choose the right compound concentration.

D *Chd.1456*

Solving a clamping problem in the aircraft industry

G. N. Butler. *The Prod Engr* 1960 Vol 39 (8) pp 471-472 (Aug)

Outlines the solution of a production problem concerned with the rotor disks of an axial flow compressor of a turbo aero-engine. A typical disk, of aluminium alloy, had to be flat and parallel within 0.0002 in. on three faces, and step dimensions had to be accurate within ±0.0002 inch. Grinding was the only possible means of finish machining, but the material ruled out the use of a magnetic table and experiments indicated that mechanical clamping would also be ineffective. Eventually, the middle grade of a double-sided tape, made by Industrial Tapes Ltd, was used, the machine being a rotary surface grinder with a horizontally mounted grinding wheel. Use of the fixture in operation is explained. 2 illustr.

D *Chcm Prb Psz*

Punch grinding fixture

H. Perina. *Tool Engr* 1960 Vol 45 (2) p 38 (Aug)

Special punch points can be ground on a surface grinder by using the device illustrated. 1 illustr.

D *Alm Chcm Pr Psc*

Microhoning is sole machining . . .

American Bosch Arma Corp, Springfield, Mass. *Cross Hatch* 1960 Vol 12 (1) pp 2-4 (May-June)

Microhoning is being used for machining hydraulic accumulator housing bores, the process being regarded as the most suitable for generating the functional surface characteristics in the accumulator bore. Economy is realized because Microhoning is the sole machining operation performed in the bore, only a cleaning process preceding it. Bores ranging in diameter from 3 in. to 6.18 in. and lengths from 6¾ in. and 123 in. are rough and finish Microhoned. The stages of the operation are described. 5 illustr.

D *Chcc*

Putting gun reaming to work

H. Gregg. *Tool Engr* 1960 Vol 45 (1) pp 47-49 (July)

Multiple-flute gun reamers have passed the stage of laboratory development and are being successfully applied in many plants. They produce smooth, accurate holes at high production rates. 4 illustr.

X *Celz Pr*

Investigation into the accuracy of the automatic grinding process

G. G. Baranov. *Izv Akad nauk SSSR, Otd techn nauk Energet i Avtomat, Moscow* 1959 (6) pp 162-171; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (4) p 337 (Apr) (Original in Russian)

Reports experiments made on the centreless grinding of exterior cylindrical surfaces. The writer draws provisional conclusions as to the possible automation of the centreless grinding process.

K *Chcc.133*

Methods of grinding mass produced precision rings

M. P. Merpert, Yu. S. Reibakh. *Machines & Tooling* 1960 Vol 31 (4) pp 23-26 (Apr) (Original in Russian)

6 illustr, 2 ref. *D* *Az Chc.1456*

Automatic grinding of ball pins

S. A. Nikitin. *Avt prom* 1959 (10) p 44 (Oct); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 566 (May) (Original in Russian)

D *Agqz Chc.133*

Increasing ball grinding machine output in connection with the grinding of ball bearings

S. P. Baikov *et al. Prom energ* 1959 Vol 14 (9) pp 38-39 (Sep); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 566 (May) (Original in Russian)

D *Ay Chc Pr*

Selecting the power for the wheel drive in internal plunge grinding

M. R. Besser. *Machines & Tooling* 1960 Vol 31 (2) pp 21-23 (Feb)

7 illustr. *D* *Chcd.21*

The nature of vibrations occurring during plunge grinding

V. V. Puzanov. *Machines & Tooling* 1960 Vol 31 (2) pp 23-26 (Feb)

7 illustr, 4 ref. *D* *Chcd Qn*

Protecting grinding wheels of internal grinding machines

B. V. Vinogradov. *Mashinostroitel'* 1959 (9) p 29 (Sep); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 566 (May) (Original in Russian)

D *Chcn Pr:Pe.138*

Modern ideas on the mechanical polishing of metals

L. E. Samuels. *Research, Lond* 1960 Vol 13 (9) pp 344-349 (Sep)

A widely accepted view is that mechanical polishing occurs by a process of surface flow, producing a drastically-altered, amorphous-like layer known as the Beilby layer. However, evidence obtained recently indicates that this is not so, at least when metals are polished by the use of fine abrasives. The new evidence indicates that polishing occurs primarily by cutting, producing a crystalline, but plastically deformed surface. 6 illustr, 15 ref.

See also *Industr Diam Abstr* 1959 Vol 16 p A88 (May); 1960 Vol 17 p A130 (May).

X *Bf Chm.21*

Methods of surface preparation. Verfahren der Oberflaechenvorbehandlung

H. H. Reinsch. *Technik u Betrieb* 1960 Vol 12 (7) pp 127-128 (July) (In German)

The methods include grinding and polishing with conventional tools.

A *Chc Unf/Chm Unf*

Machining metal cutting machine spindles

A. I. Vaks, L. I. Terekhova. *Machines & Tooling* 1960 Vol 31 (4) pp 12-18 (Apr) (Original in Russian)

One of the most important aspects of machining the spindles is grinding. After grinding, the eccentricity of the external and internal spindle surfaces should not exceed 0.0011 to 0.0003 inch. Accuracy is achieved by grinding the external surfaces in two operations, by adjusting the cutting conditions, using appropriate grinding wheels, and also by using sufficiently rigid and accurate machines. 10 illustr.

D *Agp Chc*

Economical lapping in mass-production on a small or large scale. Wirtschaftliches Laeppen in der Klein- und Grosserienfertigung

H. H. Finkelnburg. *TZ prakt Metallbearb* 1960 Vol 54 (6) pp 264, 265-269 (June) (In German)

13 illustr. *A* *Chd*

Tooling fine tolerances into short runs

Hydromatics Inc. *Metalworking Prod* 1960 Vol 104 (23) pp 72-74

Carefully planned tooling is said to have eliminated possible effects of inadequate operator skill and resulted in production of military ball valves in very short runs to close tolerances. Various operations are described, including finish lapping on a Taft-Pierce machine to final spherical trueness of 0.0002 to 0.0003 in. and surface finish of 4 micro-inches (r.m.s.). 8 illustr.

D *Chd.134/Chm.134*

Preparing polished surfaces for microscopic examination in reflected light. I, Preparation of laps

E. W. Roberts. *Trans Brit Ceram Soc* 1955 Vol 54 (3) pp 120-125; *J Amer ceram Soc* 1960 Vol 43 (7) p 177 (July)

The disadvantages of polishing with free abrasives on cloth laps and with fixed abrasives by elaborate existing techniques are discussed. Preliminary experiments with abrasives fixed in various plastic bonding materials led to a successful method of polishing with abrasives fixed in disks of dental acrylic resin. The preparation of these disks is described.

X *Chm Rd Urb*Chm Rdb*

Preparing polished surfaces for microscopic examination in reflected light : II, Carrier for automatic polishing

E. W. Roberts. *Trans Brit Ceram Soc* 1955 Vol 54 (3) pp 126-132; *J Amer ceram Soc* 1960 Vol 43 (7) p 177 (July)

A simple epicyclic carrier is described.

X *Chm Psz.133*

Oblique plunge grinding — an economical method. Schraegeinstechschleifen — ein wirtschaftliches Verfahren

K. R. Pawlowitz. *Technik u Betrieb* 1960 Vol 12 (6) p 112 (June)

2 illustr. *A* *Chcd.1456*

A brief survey of wire rod defect—their occurrence and detection

G. Earnshaw. *Wire Ind* 1960 Vol 27 (319) pp 681, 683-685, 706-707 (July)

Sampling procedure for the detection of defects includes grinding samples after cropping to remove material that has been bruised by the rod croppers. This is best done with a power grinder using either an abrasive belt or wheel, wet grinding being probably better than dry grinding. 10 illustr.

L *Chc.1342.2591*

Grinding of centre holes. La rettifica dei fori di centratura

A. Schatz. *Macchine* 1960 Vol 15 (6) pp 597, 599, 601, 603 (June) (In Italian, original in German)

See *Werkstattechnik u Maschinenbau* 1958 Vol 48 (7) pp 349-354 (July); *Industr Diam Abstr* 1958 Vol 15 p A141 (Sep). 4 illustr. *M* *Chc.1456*

Corner speeds and corner acceleration in crank grinding. Winkelgeschwindigkeiten und Winkelbeschleunigungen in Kurbelschleifen

K.-H. Sieker. *FeinwTech* 1960 Vol 64 (6) pp 199-207 (June) (In German)

11 illustr, 9 ref, 6 tables.

A *Agn Chc*

Abrasive cutting, Pt II

H. T. Biechele. *Grinding & Finishing* 1960 Vol 6 (6) pp 40-42 (June)

Abrasive wheel recommendations, work holding, case histories, and general considerations which favour abrasive cutting over alternate methods are the major topics of the concluding part of this series. 6 illustr.

D *Ceg Pef*

Wheel testing [:] How-when-why

Anon. *Grinding & Finishing* 1960 Vol 6 (6) pp 44-46 (June)

Testing procedures are covered by type of operation. 3 illustr. *D* *Pe.1341*

Form tool grinding

E. T. Larson. *Automat Mach* 1960 pp 35-38 (Mar); *Pera Bull* 1960 Vol 13 (6) p 150 (June)

Describes one company's methods of keeping form tool grinding costs low. *X* *Chcb.1456*

A B C's of grinding wheel selection

C. F. Brown. *Mill Fact* 1960 pp 87-90 (Apr); *Pera Bull* 1960 Vol 13 (6) p 150 (June)

D *Pe.18*

Diamond mandrel grinds holes of .022" diameter

Precision Diamond Tool Co, Elgin, Ill. *Mach Tool Blue Bk* 1960 Vol 55 (7) p 212 (July)

Precision grinding of small diameter holes in all types of material can be done rapidly with a new diamond mandrel. The shanks are hardened and ground to a very close limit. Diamonds are mounted under controlled atmospheric conditions by a new patented electronic method. In addition to their wide usage on jig grinding equipment, precision internal grinding is possible and the mandrels are claimed to be ideal for carbide drawing and heading dies. A complete range of sizes from 0.018 in. to ¼ in. diameter is offered. 1 illustr. *D* *Chcw Nqf*

Surface grinding aluminium castings

Mattison Machine Works, Rockford, Ill. *Metalworking Prod* 1960 Vol 97 (4) p 72 (July 22)

A large, specially designed surface grinder is used to perform a delicate finish grinding operation on aluminium torque converter housings. Both the engines and transmission faces of the housings are ground, parallelism and flatness being held to 0.003 inch. General rules are given on grinding aluminium. Wheel speeds, proper lubrication, and correct wheel choice are essential, and where no previous experience with a specific alloy is available, advice should be sought from the grinding wheel manufacturers. 2 illustr.

D *Am Bfg Chcm Pr*

New method of grinding flat surfaces

Mattison Machine Works, Rockford, Ill. *Mod Mach Shop* Vol 33 (3) pp 188-189 (Aug)

A new type of rotary indexing surface grinder, the 24A-P, on which the work is held in a stationary fixture under a wheel spindle that orbits as it rotates, reduces the cost of grinding piece parts to close flatness tolerances. The grinder is being used in its first commercial application to grind pump piston cover assemblies to a flatness tolerance of 0.0005 in. at a production rate of 140/hour. Stock removal is 0.004 inch. 1 illustr. *D* *Chcm Pr*

Finishing connecting rods

Mattison Machine Works, Rockford, Ill. *Auto Engr* 1960 Vol 50 (4) p 164 (Apr)

Surface grinding operations on connecting rods can often be performed best on vertical, multi-spindle, multi-workstation automatic surface grinders. Efficiency of these machines is increased by their automatic clamping facilities. Mattison rotary grinders equipped with only two vertical spindles may be used, and the two separate surface grinding jobs can be done on each side of the connecting rods with their caps attached. In some applications, two such machines may be used. A segmental wheel should be used for rough grinding and a standard wheel for finishing. 2 illustr.
D *Az Chcm Prb Psz*

Abrasive-belt head unit for contour polishing

Divine Brothers Co, Utica, NY. *Machinery, NY* 1960 Vol 66 (10) p 208 (June); *Amer Mach* 1960 Vol 104 (11) p 120 (May 30)

An abrasive belt unit, the DLS, which has been added to the line of contour polishing machinery, is also suitable for flat work. It does both slack-belt operations and work needing backing-up of the abrasive with a contact wheel or platen. Sharply contoured work can be polished and various accessories are available. 1 illustr. *D* *Chm Pee Pr*

Surface grinding machines

Soag Machine Tools Ltd, Juxon St, Lambeth, SE 11. *Tooling* 1960 Vol 14 (7) p 83 (July)

Elb horizontal spindle hydraulic surface grinders are built in nineteen sizes from 12 × 6 in. to 197 × 29½ in. grinding capacity. The standard range of forty-five models includes vertical and horizontal spindle grinders. A prominent feature of all models is the absence of a compound table, transverse feed being obtained from a cross-moving column on which the wheelhead moves vertically between square guideways. Accessories include a wheel crush forming attachment and electric and hydraulic wheel dressers. 1 illustr.
D *Chcm Prx*

Hydraulic cylindrical grinder

Dowding & Doll Ltd, 346 Kensington High St, London W 8. *Tooling* 1960 Vol 14 (7) pp 81-82 (July)

The Tripet Mar 200 universal hydraulic cylindrical precision grinder, is claimed to hold tolerances of 0.00004 in. readily, and to be especially suited to repetition internal and face grinding since both operations can be done at one work setting. External grinding can also be performed. The workhead can be swivelled to 90° for rotary surface grinding and is adjustable for grinding tapers. A diamond wheel dresser is provided, the tip of the diamond corresponding with the finished diameter on the workpiece; semi-automatic dressing and wheel wear compensation is provided. Hydraulic feeds from 0.00004 to 0.0004 in. are available and grinding wheelheads and internal grinding spindles are quickly changed; other features are listed.
D *Chcl Prx:Njb Psf*

Mounted wheels and points

Simonds Worden White Co, 1101 Negley Place, Dayton 7, Ohio. *Mach Tool Blue Bk* 1960 Vol 55 (7) pp 213-214 (July)

Dayton Safety mounted wheels and points are a specially developed line of abrasive products designed for most portable hand grinder applications. All are supplied in four different bonds and a variety of grain sizes. Recommendations for use of the different bonds are given. 1 illustr. *D* *Peh/Pez*

Centreless grinder with automatic size control

Churchill Machine Tool Co Ltd, Broadheath, Manchester. *Tooling* 1960 Vol 14 (7) p 87 (July)

The Churchill Model EC centreless grinder is equipped for grinding large quantities of identical parts by the through-feed method. Sizing is controlled by the Sigma automatic pneumatic/electric system. The components are fed automatically to the machine by a rotary hopper. Grinding wheel is 20 in. diameter and 8 in. wide. 1 illustr. *D* *Chcc Pr Wp*

Schuette WU3mS tool and cutter grinder

Rockwell Machine Tool Co Ltd, Welsh Harp, London NW 2. *Mach Shop Mag* 1960 Vol 21 (7) p 468 (July)

The WU3mS tool and cutter grinder for steel and sintered carbide tools has hydraulic action for raising and lowering the table under control of a foot lever for rapid setting. Grinding of clearance angles on spiral cutters, without need for calculating correction angles, is eased by the tilting and swivelling grinding wheelhead. Angular adjustments of the head are by direct-reading scales, irrespective of cutter diameter. A larger machine, the WU4, is also described. 1 illustr.
D *A Bfd Chc Pr/A Bkc Chc Pr*

New plant and tools

Anon. *Auto Engr* 1960 Vol 50 (4) pp 160-163 (Apr)

Machines described include the Dormer drill point thinning machine which uses one size of wheel for all types of thinning, no special shaping of the wheel being necessary. An 8 in. diameter by ¼ in. wide grinding wheel is used and feed is automatic. Symmetrical modification of the drill core is produced automatically. 9 illustr.
L *Alb Chc Pr/Agm Cej Pdb Pr*

Black diamond drill grinder

Black Diamond Saw & Machine Works, Natick, Mass. *Machinery, NY* 1960 Vol 66 (11) pp 192, 194 (July)

This newly designed drill grinder incorporates a number of advanced features said to give longer life and better performance. A newly designed stand permits the whole grinding wheel to be utilized. A new turret-type quadrant swinging the desired drill locator into direct line with the swinging arm of the grinder results in easier and faster operation and less operator fatigue. Diamonds in the wheel truers are presented to the grinding wheel at a 15° angle for self-sharpening. Sharp wheel edges for web thinning are assured by the new diamond truing device being applied to the periphery of the wheel at a 5° angle. 1 illustr.
L *Alb Chc Nv Pr:Nj Psf*

Norton around the world

A. D. Kelso (Norton International Inc). *Grits & Grinds* 1960 Vol 51 (3) pp 44-47

Representative distributors of Norton grinding wheels exist throughout the world, as do strategically placed manufacturing units for grinding wheels and coated abrasives. 3 illustr. *L* *Pe.25/Rdg.25*

Calculating grinding wheel wear and production
S. R. Uniechowski. *Tool Engr* 1960 Vol 44 (7) pp 113-119 (June 15)
5 illustr, 2 ref. *D* *Pe Unr/Pe.13*

Portable barrel deburring and finishing machine
Almco Supersheen of Great Britain Ltd, Bury Mead Works, Hitchin, Herts. *Lab Pract* 1960 Vol 9 (7) p 532 (July)
A new deburring and finishing machine, the Super Mite DBM-10, is designed especially for research departments, laboratories, and for processing small quantities of parts. Portable and compact, the machine can also be used for test runs on small components, thus saving the use of larger, costlier machines in the production line. 1 illustr. *D* *Chm Pr*

Barrel finishing with round and triangular abrasive pins
Norton Co, Worcester, Mass. *Machinery, NY* 1960 Vol 66 (11) p 188 (July)
Round and triangular-shaped abrasive pins have been developed to finish intricate parts and almost inaccessible areas of serrated or grooved machined pieces. The new shapes are called Tumblex RP (round pin), and Tumblex TP (triangular pin) abrasive. Both shapes are designed for the mass processing of metals, plastic and rubber. 1 illustr. *L* *Pn*

Abrasive slurry deburrs at high speed
Rotofinish Ltd. *Metalworking Prod* 1960 Vol 104 (23) pp 83, 85 (June 8)
Spindle polishing machines, using a spinning tub of abrasive slurry, offer a fresh approach to in-line, high-production surface finishing and deburring. Advantages claimed include finishes consistently as good as 10 micro-in., uniformity of radiusing, high output, and low-cost unskilled operation. 4 illustr.
X *Agp Chm Pr Rdc*

Walker-Turner has combination belt and disc finishing machine
Walker-Turner Div, Rockwell Mfg Co, 400 Lexington Ave, Pittsburg 8, Pa. *Amer Mach* 1960 Vol 104 (11) p 120 (May 30); *Machinery, NY* 1960 Vol 66 (11) p 210 (July)
The machine has a standard 4 in. abrasive belt and a 12 in. abrasive disk. It is said to be capable of performing 90% of all shop finishing operations efficiently and economically. 1 illustr.
L *Chm Pe Pr/Chm Pee Pr*

Precision grinder general purpose tool
Southern Engineering & Machinery Co Ltd, Millbrook, Southampton. *Engineering, Lond* 1960 Vol 189 (4899) p 354 (Mar 11)
Cylindrical, internal or external, taper and surface grinding can be done. A vibrating attachment is provided for superfinishing. A micrometer dressing attachment allows the wheel to be dressed to a pre-set dimension. 1 illustr.
A *Chcw Pr Psf Wbd*

Keighley type KFG angle-head grinding machine
Newall Engineering Co Ltd. *Machinery, Lond* 1960 Vol 96 (2485) p 1597 (June 29)
The machine is a variant of type L 12 cylindrical grinder, the main difference being that type KFG has a wheelhead mounted at 45° to the longitudinal centre line of the table, and is intended for heavy-duty plunge cutting operations and for applications where a shoulder face must be ground simultaneously with an external cylindrical surface. Equipment includes a hand-operated diamond dressing attachment. 1 illustr.
D *Chcl Pr:Nj Psf.27*

Gear-honing operation in Japan
Barnes Drill Co, Rockford, Ill. *Machinery, NY* 1960 Vol 66 (11) p 138 (July)
The production gear-bore honing machine used is said to be versatile, accurate and fast. A station-type work-holding fixture permits honing at one station while the other is unloaded and charged with a workpiece blank. All operations except loading and unloading are fully automatic. Automatic bore sizing is consistent to within 0.0002 in. from bore to bore. 2 illustr.
L *Ad Chh Prs*

'Cylinder King' honing machine
Sunnen Products Co, St Louis, Mo. *Machinery, NY* 1960 Vol 66 (10) p 262 (June)
A completely new method of re-sizing cylinder blocks has been introduced with the recently developed 'Cylinder King' power-stroked vertical honing machine. Floor-to-floor time for honing a V8 cylinder block is 33 min: this includes set-up, ridge removal, stock removal within 0.002 in. of desired oversize, finish honing to final size, and gauging and removing the block from the machine. An important feature is that cylinders can be re-sized to a minimum standard oversize since the honing tool takes its alignment directly from the original unworn part of the cylinder. 1 illustr. *D* *Chh Pr*

Lapping machine
Diesel Injection Ltd, Ruddington, Notts. *Mach Lloyd* 1960 Vol 32 (15A) p 60 (July 23); *Machinery, Lond* 1960 Vol 9 (2490) p 280 (Aug 3)
Designed for re-conditioning the seatings of diesel injection nozzles, this is a two-mandrel machine with the mandrels terminating in a conical lapper of specially treated cast iron. The machine incorporates a high precision rectifier for conical needle seatings which may be super-finished by a micro-polished lapping grinder in the rectifier. At the rear of the machine are two co-axial grinding wheels for grinding the conical lappers. Grinding can be carried out at angles varying from 57 to 60 degrees. There is a diamond truing device. 1 illustr.
L *Ac Chc Pe/Chd Pr*

Pope grinding spindles
Pope Machinery Corp, Haverhill, Mass. *Machinery, NY* 1960 Vol 66 (11) p 224 (July)
These precision internal grinding spindles have improved, concealed axial air-flow flingers, which prevent coolants from entering the spindle bearings and provide protection for operators from rotating end covers. 1 illustr. *L* *Chc Psl*

Centerless grinder supports
Livingston Tool & Development Co, Belmont, Calif. *Tool Engr* 1960 Vol 45 (1) p 110 (July)
Describes adjustable V outboard workpiece supports, for use with all makes, types, sizes and models of centerless grinders, which give full diametral coverage of the machine. 1 illustr.
D *Chcc Pr Psz*

Coolant filter lowers costs and improves grinding results
Dundick Tool Works Inc, 3410 West 31st St, Chicago 23, Ill. *Mod Mach Shop* 1960 Vol 33 (2) pp 247-248 (July)
The Dundick 'Imperial' self-flushing coolant filtering unit is said to save time, labour and cutting fluid, and to improve the ease and quality of grinding. 1 illustr.
L *Chc Pwc Sj*

Grinding wheel profiling instrument for cylindrical grinding machines. Schleifscheiben-Profiliergeraet fuer Rundschleifmaschinen

Arthur Carstens & Co, Hamburg 48. *TZ prakt Metallbearb* 1960 Vol 54 (6) p 293 (June) (In German)

The apparatus is fixed to the right-hand side of the grinding table and the control of the diamond stylus and the grinding wheel is by a dial. A pantograph arrangement transfers the movement of the tracer from the template to the stylus on the grinding wheel. All types of wheel can be profiled, the maximum depth being 25 mm and width 50 millimetres. To protect the diamond in profiling a new wheel, the wheel can be revolved at half speed. 1 illustr.

A *Ab Cgf Njb*

Plunge-out grinder

Anon. *Metalworking Prod* 1960 Vol 104 (23) p 87 (June 8)

The Newall-Keighley U/LA grinder has been specially developed for plunge grinding outer diameters of large precision bearing races. No table traverse is necessary and other design considerations have resulted in a floor saving of about 33% compared with conventional grinders of equivalent capacity. A hydraulically operated wheel dresser is mounted on the wheelhead so that the diamond is vertically above the grinding wheel. Independent feed rate controls are provided for each direction of diamond traverse, but the cycle is fully automatic. Dresser control mechanism includes a hydraulic counter which is pre-set to determine the number of components to be ground between dressings, a picking mechanism which may be set to vary the amount of diamond feed/dressing between 0.0005 in. and 0.005 in. in steps of 0.0005 in., automatic compensation for reduction in wheel diameter, and interlocks to stop grinding starting before wheel truing begins. 1 illustr. *D* *Chcd Pr:Njb Psfb*

Surface grinding machine features fully hydraulic feed

Gallmeyer & Livingston Co, Grand Rapids, Mich. *Mod Mach Shop* 1960 Vol 33 (2) p 207 (July)

The No 206 fully hydraulic feed surface grinder features micro-inch finish at production speeds. A variable speed continuous cross feed for dressing or quick positioning is provided. The severe service demanded by the use of diamond wheels is claimed to be no problem because the machine has a rugged, four bearing, grease sealed spindle, requiring no lubrication. The grinder is equipped with an 8 in. grinding wheel with 13 in. capacity under the wheel and 14 in. of vertical movement. 1 illustr.

L *Chcm Nv Pr*

Highlights of the Olympia Exhibition

Anon. *Metalworking Prod* 1960 Vol 104 (26) pp 11-12 (June 29)

Progress in centreless grinding was illustrated by the 4-wheel Wickman-Scrivener machine with automatic cycle and sizing control, which does a progressive 4-stage grinding operation that previously needed four machines. 2 illustr. *D* *Chcc Pr.27*

Wickman-Scrivener No 1 centreless grinder

Wickman Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (26) p 116 (June 29)

The new model is equipped with vibratory feeder and transport rolls for the automatic grinding of the od of ball bearing races. The machine has steplessly-variable power truing to both wheels. Main specification details are given. *D* *Chcc Prs.27*

Wickman-Scrivener 36 DPG peripheral grinder

Wickman Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (25) p 194 (June 22)

The Wickman-Scrivener 36 DPG machine is based on the Scrivener 36 in. duplex face grinding machine but has its spindles arranged at right-angles to the direction of wheelhead infeed, so that the peripheries of the two 36 in. diameter wheels are applied simultaneously to the parallel faces of the work. Features include automatically oscillating grinding wheel spindles to promote a good work finish, and independent hydraulic power-truing slides behind each grinding wheel. The latter are arranged for manual initiation on the machine exhibited, from a convenient centralized control at which the direction of diamond traverse and steplessly variable rate of traverse for both wheels are readily selected. 1 illustr. *D* *Chc Pr:Nj Psf.27*

Hauser 5 SM jig grinding machine

Wickman Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (25) p 201 (June 22)

Capacity is the same as the existing No 5 machine, but the grinder head resembles those of the smaller 3 SM and 3 SMO machines. Stroke of the grinding spindle is operated hydraulically and its speed is steplessly variable. Taper bore grinding up to 8° each side of the centre line is possible, and a combination of circular and compound tables makes possible grinding of contours of different geometrical shapes. Eccentric displacement of the grinding spindle can be used to generate segments of cylindrical surfaces. 1 illustr. *D* *Az Chc Pr.27*

Fritz Werner type 3.275/0.8 spline grinder

Rockwell Machine Tool Co Ltd, London NW 2. *Metalworking Prod* 1960 Vol 104 (25) pp 211-212 (June 22)

The grinding wheel is fed downwards automatically after each full revolution of the workpiece, the impulse being given electrically by the dividing head. Infeed is determined by the cam, the system affording a stepless change-over from rough to fine grinding and eliminating the possibilities of removing too much material. Automatic dividing and infeed make the grinding cycle virtually automatic. The spline profile can be ground in one cycle, either by a single formed wheel or by two or three separate wheels. A special truing attachment enables shafts with involute teeth to be ground. 1 illustr. *D* *Az Chch Pr Psf.27*

Spline shaft grinding

Fritz Werner AG, Berlin ; British rep : Rockwell Machine Tool Co Ltd, London NW 2. *Mech World* 1960 Vol 140 (3492) p 306 (July) ; *Engineering, Lond* 1960 Vol 189 (4909) p 683 (May 20)

An internal grinding attachment has been introduced for Werner's 3.275 range of precision automatic spline shaft grinding machines. This enables the flanks of spline bores to be ground, provided that the number of splines is even. Available grinding spindles cover bores from 13/16 in. to 3⅛ in. in diameter. Fitting and application of the attachment are described. 1 illustr.

L *Az Chcw Prs*

Abwood model SG4H surface grinder

Abwood Machine Tools Ltd, Princes Rd, Dartford, Kent. *Metalworking Prod* 1960 Vol 104 (26) pp 133-134 (June 29)

This newly-designed machine has the same capacity as the earlier SG3H model. A new feature is automatic infeed for depth of cut, which makes the machine semi-automatic. 1 illustr. *D* *Chcm Pr.27*

Abwood CG1A carbide tool grinder

Abwood Machine Tools Ltd, Princes Rd, Dartford, Kent. *Metalworking Prod* 1960 Vol 104 (27) p 108 (July 6)

A re-designed version of the earlier CG1, this model has a heavier and more rigid pedestal and greater coolant capacity. The spindle head provides for mounting of two 8 in. diameter wheels on arbors and between flanges. Tables are larger and feature wider shoulders taken well past the wheel. 1 illustr.

D *A Bk Chc Pr.27*

Barnesdril model 244 honing machine

Gaston E. Marbaix Ltd, Vicarage Crescent, London SW 11. *Metalworking Prod* 1960 Vol 104 (26) pp 126-129 (June 29)

Designed for easy operation and maintenance, the machine has Plugmatic bore-to-bore sizing for keeping size consistency within 0.0002 inch. Overall bore capacities range from ½ in. to 6 in., but large diameter applications depend on amount of stock removal, bore length and material. A new electric hone expansion unit eliminates valves and rectifiers in electronic controls. Rapid expansion, rapid collapse, and automatic compensation for stone wear are electrically controlled. The machine is also available with pneumatic hone expansion. 1 illustr.

D *Chh Pr.27*

Bryant Centalign automatic internal grinder

Bryant Chucking Grinder Co; British rep: Buck & Hickman Ltd, Otterspool Way, Watford. *Machinery, Lond* 1960 Vol 97 (2487) pp 101-102 (July 13)

The Centalign internal grinder is characterized by the fact that traversing and cross feed motions are imparted to a cylindrical housing for the high-frequency grinding spindle, and conventional workhead and wheelhead slides are unnecessary. Thrust forces for these motions are applied in the same plane, co-axial with and at right angles to the centre line of the wheel spindle, and this arrangement is claimed to ensure high stability and rigidity for grinding bores to very close tolerences. Cycle times are said to be much reduced because deflection is virtually eliminated so that coarse infeeds can be applied. Adjustment can be made to compensate for reductions up to 0.005 in. in grinding wheel diameter resulting from wear and truing. Control of the workpiece bore is automatic during the grinding cycle and is either by a diamond sizing arrangement and by-plug gauging or an air gauging system. With diamond sizing, the wheel is automatically brought clear of the work at the end of the rough grinding stage, the spindle housing is then adjusted in a cross-wise direction by an amount which provides for dressing and also compensation for wear. When dressing is completed, the housing is again advanced transversely, and the wheel is passed into the bore for taking the finishing cut. 1 illustr.

D *Chcn Pr:Nj Psf.27*

Thielenhaus automatic micro-finishing machine

Wickman Ltd. *Machinery, Lond* 1960 Vol 96 (2485) pp 1596-1597 (June 29)

The German-built type SF 125 machine is designed for components from 0.4 to 4.9 in. diameter and is particularly intended for handling work in large quantities by the through-feed method. The oscillation frequency of the eight stone-carrying heads can be varied between 500 and 1,200 strokes/minute. Automatic and independent control is provided for each of the heads, so that the amount by which the stone projects from the carrier is automatically measured while the machine is working, and when it reaches a pre-determined minimum a warning lamp is illuminated. 1 illustr. *D* *Chmz Prs.27*

Spandau SJP.11 automatic bore and face grinder

Stanley Howard Ltd, 73 Devon St, Saltley, Birmingham 7. *Metalworking Prod* 1960 Vol 104 (26) p 135 (June 29)

Maximum grinding capacity is 3 in. diameter and the machine is claimed to be unique in operation in that bore grinding and facing are done automatically without intervention by the operator; thus a perfect alignment between bore and ground face is guaranteed. The complete operation, including loading and unloading is done in 66 sec at 80% efficiency. 1 illustr.

D *Ad Chc Prs.27*

Schaffner cylindrical and internal grinder

B.P.S. Machine & Spares Co Ltd, 245 Knightsbridge, London SW 7. *Metalworking Prod* 1960 Vol 104 (26) p 137 (June 29)

The precision grinder, shown first in this country at Olympia, has been developed for small to medium sized parts, either for single pieces or for long production runs. Operation is entirely hydraulic both for longitudinal and transverse movement. Automatic infeed of the wheel head to a pre-determined size is a feature. Maximum capacity is 6 in. diameter by either 16 or 24 in. long. 1 illustr.

D *Chcw Prx.27*

Kamenicek type BDA 63 semi-automatic internal grinder

Selson Machine Tool Co Ltd. *Machinery, Lond* 1960 Vol 96 (2485) p 1612 (June 29)

The machine is designed for semi-automatic operation on an electrically controlled hydraulic cycle and can be used for handling parts in small or large cycles. Bores from 3.2 up to 10 in. diameter and of maximum depth of 12.6 in. can be ground on workpieces up to 25 in. in one setting of the wheelhead. If the wheelhead is set up in another position, bores up to 22 in. diameter can be ground. A cam-operated arrangement sets the diamond wheel dresser in relation to the work axis for controlling the diameter of the ground bore. Alternatively, automatic work sizing can be controlled by a plug gauge on an 'impulse' gauge. 1 illustr.

D *Chcn Prsb:Nj Psfz.27*

[Adams copy band grinding machine]

Cyril Adams & Co Ltd. *Mach Shop Mag* 1960 Vol 21 (6) p 362 (June)

The company has developed a copy band grinder in conjunction with Armstrong Siddeley Ltd, who hold the patents for the principle of operation. The machine is designed for the precision contour grinding of components such as turbine blades and the cutting medium is a narrow continuous abrasive belt running at 6,500 ft/minute. This type of machine is also being developed for superfinishing, and it is claimed that by using a linen twill band loaded with a lapping paste, it is possible to obtain finishes in the order of 2 to 2½ micro-in. with a stock removal of 0.001 in./pass. 1 illustr. *D* *Chcw Pee Pr.27*

[Browne & Sharpe grinding machines]

Brown & Sharpe Ltd. *Mach Shop Mag* 1960 Vol 21 (6) pp 362-363 (June)

Three new grinding machines are reviewed: the No 5 plain cylindrical grinder, the No 510 surface grinder, and the 618 Micromaster. The latter is a horizontal spindle surface grinder with an optical viewing system. Work up to 14 × 6 in. can be ground but when the optical system is in use, work must be between 4½ in. and 8½ in. above the table top. There are three basic models of the machine and the optical system is available with one of six magnifications from 10 : 1 to 100 : 1. *D* *Chcl Pr.27/Chcm Pr.27*

Jung CM8 automatic internal grinder

Rockwell Machine Tool Co Ltd, London NW 2. *Metalworking Prod* 1960 Vol 104 (26) pp 125-126 (June 29)

The machine is basically similar to the Jung C8 but has magazine loading. It is set up for grinding bores of bevel gears which are tipped into a vibrating hopper for sorting and feeding to the magazine. Chucking, centring and ejection of the workpieces are automatic. Size control can be either by setting the dressing diamond or by plug gauge. When using the former method, the diamond is automatically raised to dress the wheel between the roughing and finishing operations. When the plug gauge method is used, the wheel is dressed when the first section of the gauge enters the work, the finished size being determined by the entry of the second section. Bores up to 1¼ in. diameter by 3¼ in. long can be ground. 1 illustr.

D *Ad Chcn Prs:Nj Psf.27*

Strausak type 124 cutter grinding machine

Adam Machine Equipment Ltd. *Machinery, Lond* 1960 Vol 96 (2485) p 1589 (June 29)

This Swiss-built machine is specially designed for sharpening tungsten carbide milling cutters, in particular those for gear cutting machines. An optical device is included for setting the teeth of the cutter to be ground relative to the diamond wheel, which is of 2.36 in. diameter and is driven at speeds from 5,000 to 8,500 rev/min. by a 0.35 h.p. motor. Cutters up to 1.57 in. od and 1.37 in. long can be handled and up to 30 teeth can be ground. 1 illustr.

D *Alc Chc Nv Pr Pscz.27*

Thompson B5-12-24 Plungematic grinder

Coventry Gauge & Tool Co Ltd. *Metalworking Prod* 1960 Vol 104 (25) pp 194-195 (June 22)

This is a completely automatic, plunge-feed machine for fast production on surface grinding work where the wheel width constantly covers the area to be ground. The automatic cycle includes a triple down-feed arrangement with intermediate wheel dressing and compensation, rapid return of the grinding headstock to the start position, and table return to loading position. 1 illustr. *D* *Chcm Pr Psf.27*

Orcutt GA 7 spur gear grinder

Gear Grinding Co Ltd, Solihull, Warwicks. *Metalworking Prod* 1960 Vol 104 (25) pp 252-253 (June 22)

The machine incorporates a single diamond root trimmer of new design. The fillet of the root is both the weakest part of the gear and the most difficult part of the tooth profile to grind. With this trimming device, the arm in which a single Diatorc diamond is mounted is free to rotate in bearings in a horizontal carriage. This carriage is traversed in friction-free slides by a hydraulic cylinder, tack-teeth on the piston rod engaging a pinion on the diamond arm. The diamond arm rotates if movement of the slide is restricted. In practice, micrometer stops control both the horizontal movement of the carriage and the arc of rotation of the diamond arm at both ends of the stroke. Electric switch limits also reverse or stop the system. Thus, the generation of the root form and the blend into the involute form on the grinding wheel can be accurately controlled. Ease of setting is claimed. 1 illustr.

D *Add Chc Pr.27|Add Chc N.27*

International Machine Tool Exhibition, London 1960

Anon. *BSA Tools Div J* 1960 Vol 4 (4) 76 pp (June)

This issue describes in some detail examples of the latest additions to the range of BSA machine tools. These include grinding, broaching, threading and tapping machines. *D* *Ceq Pr.27*

Cincinnati Spiropoint drill grinder

Cincinnati Lathe & Tool Co, USA; British rep: Charles Churchill & Co Ltd. *Metalworking Prod* 1960 Vol 104 (25) pp 254-255 (June 22)

The Spiropoint grinds cutting surfaces of a twist drill to a shape developed by Cincinnati to give optimum cutting conditions. The drill is held stationary while a tubular grinding wheel gyrates around its point in a 6 in. diameter path. It is adjustable to grind a range of drill sizes, to produce clearance angles above or below the normal amount, and to cut point angles from 90 to 180 degrees. Three facets of the grinding wheel control drill point shape, *ie* face, radius, and outside diameter. The truing unit is adjustable by direct reading dials to ensure control of each facet. Outside diameter of the wheel is controlled by the position of the diamond nib, and for truing it must be correctly positioned. Operation of the machine is explained. 1 illustr.

D *Albz Chc Pr:Nj Psf.27*

Ewag type WS 11 carbide tool and cutter grinder

Matchless Machines Ltd, 18 Bolton St, London W 1. *Metalworking Prod* 1960 Vol 104 (27) p 104 (July 6)

The latest model of this tool grinder has a workhead quill holder with a capacity of ¼ in. diameter, giving an increased range. Double inclining workhead and steplessly-variable work speed make it suitable for the rapid production of small instrument parts and carbide cutters. Most parts can be ground at one clamping with increased accuracy. Additional features include the Movomatic electronic micrometer which gives direct readings to 0.00001 in. over a range of zero to 0.47 in. diameter. 1 illustr.

D *A Bk Chc Pr Wbdz.27*

[Heald Centri-Matic]

Alfred Herbert Ltd. *Mach Shop Mag* 1960 Vol 21 (6) p 366 (June)

The Heald 0901 Centri-Matic for internal grinding of small work, *eg* miniature bearings, has a plunge grinding cycle and an automatic radius truing device. Bores down to 0.040 in. can be ground.

D *Chcn Pr Psf.27*

[Snow grinding machines]

Snow & Co Ltd. *Mach Shop Mag* 1960 Vol 21 (6) pp 370-371 (June)

Three machines are described here, including the model OS.42/12 precision surface grinder with a table capacity of 42 × 12 inch. Maximum distance from the underside of the grinding wheel and the table is 15 inch. An automatic downfeed is incorporated and this works in conjunction with automatic sizing equipment, which is arranged to compensate for wheel wear every time the wheel is trued. *D* *Chcm Pr Psf.27*

USP 2,912,803 (Oct 14, 1957) **L. G. Simjian**

Abrading device

The device is of the type which operates by relative motion between loose particles and the article surrounded by them. Difficulties are experienced when polishing irregular contours and many such articles must then be polished by hand. The difficulties are overcome by placing articles and abrasive particles in a flexible container. The abrasive particles may be diamond powder, boron or silicon carbide, aluminium oxide, hardened steel particles, barium ferrite, manganese-bismuth particles mixed with oil, water, turpentine, carbon tetrachloride, or trichlorethylene. A number of such containers are then placed in a rotary barrel where they are tumbled and become squeezed and distorted. (4 claims, 5 illustr). Ref cited: 3 USP.

J *Km Nvz.545|Pez Rd.545*

USP 2,910,808 (Jan 15, 1954) **E. Wildhaber**

Method and apparatus for grinding gears

The same grinding wheel profile is used during the whole life of the wheel. Preferably two wheels set with their grinding surfaces facing each other are used. Ease-off is attained by advancing the wheels individually at the end of the grinding strokes whereby the wheels are turned very slightly about parallel pivots in time with the grinding strokes, *ie* the same pivots about which they are adjusted to produce the helix angle of the teeth. Each wheel advances along a line inclined at an acute angle to the axis of the grinding wheel. The wheels are clear of the workpiece during each return stroke when the work is rotated to permit the wheels to enter different tooth spaces on successive strokes. For truing, a wheel is advanced slightly beyond its true position along inclined ways towards the truing diamond in a single motion. (28 claims, 17 illustr). Ref cited : 11 USP.

J *Ad Chc Pr:Njn Psf.545*

USP 2,911,772 **H. Gronemeier, E. Hoogland Zuschneidemaschinenfabrik**

(Mar 26, 1957—conv date, Germany)

Grinding device for cloth cutting machines and the like

Grinding disks or grinding belts hitherto employed for cloth cutting machines have been un satisfactory. The device shown in Fig 17, 18, 19, 20, 21 consists of plier-like rod-shaped arms 9, 9a tiltable in a horizontal plane about a pivot 8. The grinding elements 12, 12a are composed of resin, mineral, or ceramic bonded diamond chips or dust. The grinding device is

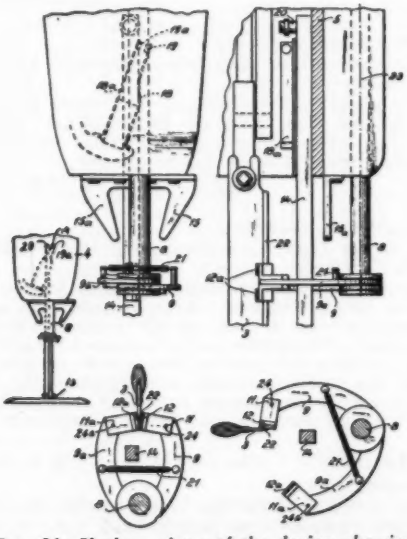


Fig 17 to 21. Various views of the device, showing rod-shaped arms 9, 9a which may be tilted horizontally about pivot 8. USP 2,911,772.

reciprocated independently and arranged as a unit to be separately attached to a cloth cutting machine. When guide 8 moves downward into operative position, arms 9 slide along cams 15, 15a and the grinding elements 12, 12a grip the rapidly reciprocating knife 3. The grinding angle for cutting edge 22 can be varied by adjusting holders 11, 11a about their pivots 24, 24a. (6 claims, 8 illustr). Ref cited : 10 USP.

J *Pee.545*

USP 2,912,804 (June 16, 1958) **L. G. Simjian**

Method for polishing articles

The application of a superfine finish to articles with irregular surfaces, *eg* hidden recesses and re-entrance cavities, undercuts, is extremely difficult if not impossible. However, such finish may be required for parts, such as gears, of analog computers and other high precision computing devices. The method employs ultrasonic power and shock waves. The articles to be polished are coated with a layer of discrete abrasive particles, carborundum, emery, garnet, diamond grit, *etc*, suspended in an adhesive medium, such as clear lacquer, sprayed onto the article. The article is then immersed in an ultrasonic cleaning bath. The shock waves will 'clean' the article while the abrasive particles become progressively vibrated and loosened thereby abrading the workpiece. Parts capable of being magnetized may be finished by using particles which adhere by magnetic attraction. (5 claims). Ref cited : 3 USP.

J *Az Chm.1456.545*

USP 2,915,854 (Mar 28, 1957) **H. L. Ettman**

Microtome knife stroppers

Hand stropping of microtome knives is effective only where the grain size of the abrasive incorporated in the leather strop falls within a narrow range of relatively large particles. The skill required for this work causes hospitals, laboratories, *etc*, to make use periodically of a special expensive service. The stropping machine described in the specification does not require skilled personnel. It operates with a wheel of no less than 8 in. diameter. The peripheral covering is of cordovan leather in which diamond-base abrasives are embedded, having a fineness within the range of 14,000 to 25,000 mesh. The wheel rotates at 750 to 1,000 rev/minute. The velocity should be within this range inversely proportional to the mesh size of the abrasive. (3 claims, 4 illustr). Ref cited : 11 USP.

J *Alz Chh Nqe.545*

USP 2,916,858 (July 18, 1958) **A. F. Hudson**

Contour forming machine

The machine is designed for the automatic grinding of single point carbide tipped cutting tools. Usually the steel under the carbide tip is ground with an aluminium oxide wheel. The next step is the grinding of one angle of the carbide tip with a silicon carbide wheel, then the other angle with the same wheel. The fourth step consists in rough grinding the radius with the silicon carbide followed by lapping with a diamond wheel. The fifth step is finish grinding the tool with a medium coarse diamond wheel, and the last operation is to lap the finish ground form with a fine diamond wheel so as to obtain a low micro-finish on the carbide portion. The new machine is provided with an electrically controlled automatic programming device for the transverse and longitudinal movements of the work-table and the pivoting of the workpiece holding fixture with hydraulically operated movements following a master template. A 46 grit vitrified silicon carbide wheel is used, 14 in. od, 11 in. id, and 4 in. thick. The roughing speed is 865 rev/min, surface speed 2,700 ft/min, the finishing speed 1,730 rev/min, surface speed 5,400 ft/minute. A finish of less than 20 micro-in. was obtainable on a tool ¾ in. wide, 1¼ in. high, in 48 seconds. (29 claims, 20 illustr). Ref cited : 7 USP ; 1 FP.

J *Al Chcb Pr.545*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

FP 1,195,317 (Dec 17, 1956) **F. L. Curtis, Cie des Meules Norton SA**

Grinding wheel mounted on a stem for grinding bores of small diameter. Meule montée sur tige pour la rectification d'alésages de faible diamètre

A metal stem is covered at its one roughened end of reduced diameter with a layer of fused abrasive. The major part is a crystallized metal oxide with a well defined fusion point selected from the group of aluminium oxide, zirconium oxide, titanium oxide, and mixtures of these oxides, applied by blow pipe flame pulverisation. Grinding pencils down to 1.65 mm diameter have been produced whereas previously the smallest diameter of such tools was 2.5 millimetres. The rotational speed may be 100,000 rev/min, which means a peripheral speed of 8 m/second. (4 claims, 3 illustr). *J* *Az Chc Pe.21.545*

FP 1,196,962 **NV Philips' Gloeilampenfabrieken** (Nov 29, 1956—conv date, Netherlands)

Device for superfinishing a spindle. Dispositif de superfinition d'un axe

A metal surface cannot be successfully superfinished if the amorphous layer does not reach a certain depth. Thus, a cylindrical surface machined with a diamond cannot usually be superfinished but a ground surface can. The superfinishing step executed with a special stone oscillating in longitudinal direction under certain conditions of pressure, speed, and lubrication, removes the amorphous layer from the rotating workpiece until the virgin metal appears, when the film of lubricant, which forms owing to the then reduced specific pressure, prevents further abrasive action. Hitherto a short stone was used and the minimum diameter of a spindle to be superfinished was 10 mm, its length being 4 to 6 times this diameter. It has been found that much longer spindles of lesser diameter can be superfinished by using a stone at least equal in length to the spindle to be finished while the pressure on the stone is kept constant by fluid pressure control within narrow limits. It is preferable to use a stone of a length equal to the length of the workpiece plus twice the amplitude of the oscillation of the stone. A spindle of 4 mm diameter and a length of 76 mm was superfinished under a pressure of 10 kg rotating at 200 rev/min while the number of oscillation of the stone was 550/min with an amplitude of 2 millimetres. The lubricant was paraffin oil. (2 claims, 2 illustr).
J *Alz Chs.545*

MACHINING DEVELOPMENTS

In shops around the country : Wisconsin

Evinrude Motors, Milwaukee, Wisc. *Machinery, NY* 1960 Vol 66 (11) p 141 (July)

An electrolytically-assisted brass wheel with 120 grit natural diamond bonded in its periphery, removes 0.025 in. of material/pass in grinding a chip breaker into a tungsten carbide tool. Conventional diamond wheels had previously been able to remove only 0.001 in./pass. 1 illustr. *L* *Bkcb Chcr Nv*

Out of the melting pot : Further thought

Anon. *Metal Ind, Lond* 1960 Vol 96 (25) p 494 (June 17)

Refers to the Russian method of using high velocity fluid jets to machine metals and suggests further developments of the process.

See *Industr Diam Abstr* 1960 Vol 17 p A153 (June).
D *Bf Ceqr Rdb*

Researching the ' refractories '

J. H. Mainhardt, D. Weisinger. *Machinery, NY* 1960 Vol 66 (10) pp 184-187 (June)

Study of techniques for machining and forming tungsten, molybdenum, columbium, and tantalum is described. One example is grinding tungsten : only electrolytically-aided diamond wheels are effective and even these raise problems. The usual electrolyte has not been strong enough, while low conductivity means that the material must be held on the machine table in steel plate liners. 6 illustr.
D *Ba Ceq.21/Bfp Chcr Nv*

Finishing holes by calibrating

M. Ya. Freidkin, M. S. Levina, E. N. Zhustarev. *Machines & Tooling* 1960 Vol 31 (2) pp 41-43 (Feb)

To obtain accurate holes with a high class of surface finish in components made from various metals, burnishing with carbide calibrating tools can be used instead of metal cutting methods. The main advantages of the method are simplicity, high productivity, with extremely long life of tools which are simple to manufacture. The principles of the process are explained. 8 illustr. *D* *Bf Chm Qdd*

Ultrasonics will go round corners

Sheffield Corp, USA. *Metalworking Prod* 1960 Vol 104 (24) p 169 (June 15)

Ultrasonic vibrations can be distributed from a single central source to a number of work stations ; ultrasonic transmission lines are used to convey the energy over distances from a few inches to several feet, round corners and into holes. Arrangement of the transmission lines is said to be practically unlimited. Based on this development is the eight station Sheffield Cavitron machine designed to machine silicon wafers approximately 0.05 in. thick. 2 illustr.
D *Bhc Ceqr*

The economical use of spark-erosion in the manufacture of dies. Wirtschaftlicher Einsatz der Funkenerosion im Gesenkbau

J. Wenzel. *Industr Anzeig* 1960 Vol 82 (53) pp 861-865 (July 1) (In German)

8 illustr, 8 ref. *K* *Ax Ceqmb*

A new method of sharpening sintered carbide tools. Nuovo metodo di affilatura per utensili in metallo duro

Anon. *Macchine* 1960 Vol 15 (6) p 619 (June) (In Italian)

Discusses electrolytic grinding of sintered carbide tools with the new Agathon Eleform grinder.

See also *Industr Diam Abstr* 1960 Vol 17 p A104 (Apr). *M* *A Bkc Chcr Pr*

Electrolytic grinding machine

Rockwell Machine Tool Co Ltd, Welsh Harp, Edgware Rd, NW 2. *Tooling* 1960 Vol 14 (7) p 88 (July)

The Charmilles 'Eleform' electrolytic grinding machine is intended for the machining of carbide and other metal alloys difficult to machine by conventional methods. This is claimed to be a fast way of grinding carbide tools, producing a high quality finish and fine cutting edge. For profile grinding, a formed wheel is used which is subjected to little wear by the electrolytic process. 1 illustr. *D* *Chcr Pr*

Sparcatron Mk. V spark erosion equipment

Impregnated Diamond Products, Gloucester. *Machinery, Lond* 1960 Vol 97 (2491) pp 344-345 (Aug 10)

Describes demonstrations of Sparcatron equipment, with particular reference to the Mk. V machine. 2 illustr. *D* *Ceqmb Pr*

Now we have localized electropolishing

Jaquet, France; British rep: Metallurgical Services, Reliant Works, Betchworth, Surrey. *Metalworking Prod* 1960 Vol 104 (35) p 93 (Aug 31)

The latest in a range of scientifically-developed localized metal treatments is localized electro-polishing by the Ellopol technique. The stainless polishing stylus sheathed in glass fibre, is soaked in electrolyte and used up to 50 volts. 1 illustr.

D *Chmk.1456*

Electropolishing . . . a multipurpose process

H. W. Bredin. *Machinery, NY* 1960 Vol 66 (11) pp 113-115 (July)

Among many applications for which electro-polishing can be used are deburring and electro-machining. In several cases, some operations can be eliminated and results improved by using the process. Various examples are quoted. 4 illustr.

D *Chmk*

Construction of a lead crystal monochromator for neutron diffraction studies

D. F. Litvin. *Sov Phys, Crystallogr* 1960 Vol 4 (5) pp 623-627 (May) (Original in Russian)

Large single crystals of lead have been grown. A method has been developed for the electric-spark cutting of plates from single-crystal ingots with given orientation of the crystallographic axes. 7 illustr, 5 ref.

X *Bfm Ceqm*

Aspects of spark-erosion machining of templates. Gesichtspunkte fuer die funkenerosive Bearbeitung von Schnittplatten

K. Ganser. *Industr Anzeig* 1960 Vol 82 (54) pp 885-890 (July 5) (In German)

This process enables hardened tool steels, and more particularly sintered carbides, to be used as tool material to a far greater extent than was hitherto possible. Gives details of the method as applied to the machining of templates. 20 illustr, 11 ref, 1 table.

K *Az Ceqmb*

The influence of the duration of discharge and of the material on precision machining by spark-erosion. Ueber den Einfluss von Entladungsdauer und Werkstoff bei der funkenerosiven Feinbearbeitung

K. Ganser. *Industr Anzeig* 1960 Vol 82 (54) pp 875-878 (July 5) (In German)

7 illustr, 5 ref, 2 tables. *K* *Ceqmb*

Modernizing boosts bearing output 50%

Link-Belt Co, Indianapolis, Ind. *Amer Mach* 1960 Vol 104 (11) p 87 (May 30)

At a new ball and roller bearing plant, high precision has been combined with mass-production and has boosted production by 50 per cent. Manual grinding has been eliminated. Electronically-controlled centreless grinders are equipped with automatic loaders and in-cycle gauging which controls wheel dressing and compensates for wheel wear. 1 illustr.

L *Chcc Prz*

USP 2,919,522 (May 23, 1958) **P. J. Robischung, Hammond Machinery Builders Inc**

Machine tool

Refers to the work supporting table of an electrolytic grinding machine with a vice which can be adjusted for holding the workpiece in selected positions towards the tool, and with means of providing a path for the electric current through the positioning unit and the work holding device with a minimum of losses and variations in electrical potential. (7 claims, 10 illustr). Ref cited: 9 USP; 1 BP; 1 FP.

J *Alz Chcr.545*

Swiss P 341,585 (Sep 11, 1957) **R. Habib, Hawerk AG**

Device for the electro-erosion of a metallic workpiece. Dispositif pour érodir une pièce métallique par voie électrique

The main disadvantage of such devices is the necessity of detaching a rotary electrode for re-conditioning.

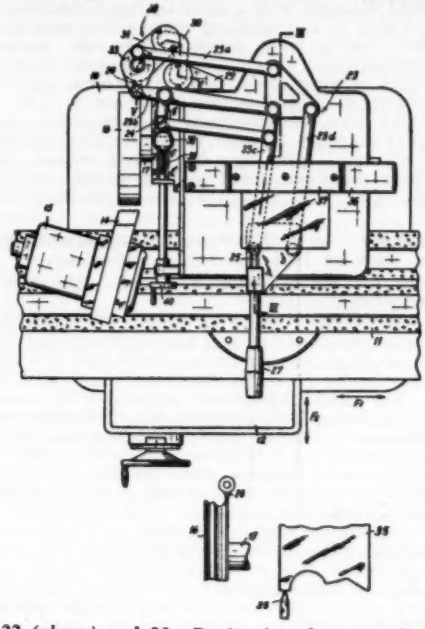


Fig 22 (above) and 23. Device for electro-erosion with incorporated truing tool 26. Swiss P 341,585.

The device represented in Fig 22 and 23 incorporates an electrode truing device, so that the profile of electrode 16 can be reconditioned by a truing tool 26 without detaching it from the main body. The truing tool is moved by a pantograph mechanism 23 and controlled by follower 25 guided by handle 27 along template 35 to provide any profile to be imparted to workpiece 14. (7 claims, 5 illustr).

J *Bf Ceqn Pr Psf.545*

Swiss P 342,299 **K. H. Steigerwald, Carl Zeiss** (July 6, 1955—conv date, Germany)

Method of working material by means of beams of charged particles. Verfahren zur Materialbearbeitung mittels Ladungstraegerstrahlen

A characteristic feature of the method is the variation of the intensity of the beam of charged particles impinging on the workpiece in timed relationship, either by pulse variations, by varying the energy of the pulses, or by varying the intensity during each single pulse or sequence of pulses. Further methods of variation are possible. The device for carrying out the method has electron-optical means of focussing and deflecting the beam to vary the area of impingement of the beam. The device may operate with several beams. (23 claims, 2 illustr). *J* *B Ceqz.545*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 340 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 224 Latymer Court, London W 6. 35s 0d, post free.

Swiss P 341,924 **H. E. de Bruyn, NV Philips' Gloeilampenfabrieken**
(Sep 6, 1955—conv date, Netherlands)

Device for machining a workpiece by means of an electrode connected to an electric voltage. Vorrichtung zum Bearbeiten eines Werkstueckes mit Hilfe einer an einer elektrischen Spannung liegenden Elektrode

As Fig 24 clearly shows, the oscillating movement of the electrode 3 causes the guide member 6 frictionally held on columns 12 to move a short step downwards each time flange 8 touches the guide member on the downward stroke of the oscillating electrode 3. Thus

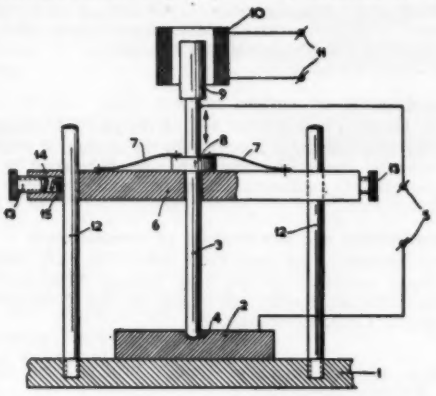


Fig 24. Diagram showing sequence caused by oscillations of electrode 3. Swiss P 341,924.

the electrode is slowly fed stepwise into hole 4 of workpiece 2. The amplitude of the electrode can be adjusted by the pulsating current to, *eg*, 20 μ to 1 millimetre. (4 claims, 1 illustr).
J *Az Ceq Ptc.545*

Swiss P 342,304 (Sep 14, 1957) **N. Mironoff, J. Pfau, Ateliers des Charmilles SA**

Method and machine for electro-machining. Procédé et machine pour l'usinage électrique

Accurate electrolytic machining by a rotary electrode requires uninterrupted feed of the electrolyte into the minute gap between electrode and workpiece which is of the order of 0.01 millimetre. This is achieved by depositing on the electrode a thin layer of the electrolyte of about equal thickness, but not less than the distance between electrode and workpiece, by using *eg* a flooded brush or roller in contact with the surface of the electrode. (6 claims, 4 illustr).
J *Ceqh Ptc.545*

DAS 1,071,251 (Dec 22, 1958) **R. Sattler, H. Schierholt, H. -J. Schulz Deutsche Edelstahlwerke AG Elektrizitaetsges**

Method and device for flushing the gap between tool and work with dielectric fluid in spark erosion machines. Verfahren und Einrichtung zum Spuelen mit Dielektrikum im Bearbeitungsspalt bei Funkenerosionsmaschinen

A decrease in the sparking frequency below a predetermined value set by an electric measuring device causes a short increased flushing of the gap between work and tool. The measuring device also influences the feed control of the electrode so as to increase the gap for a short period. The pressure of the fluid may also be increased and flushing from an additional pipe may be started. (5 claims, 1 illustr).
J *Ceqm.1456.545*

DAS 1,070,059 (June 12, 1954) **W. Osenberg**

Device for guiding a workpiece and for the frontal protection of a face grinding disk. Einrichtung zum Fuehren eines Werkstueckes und zum stirnseitigen Schutz einer Stirnschleifscheibe

The device is intended for machines in which electrolytic grinding is carried out using rotary grinding disks with narrow flexible grinding bands arranged upright and adjustable between clamping rings. A cover plate is provided having annular grooves and a radial grinding slot for the workpiece into which the grinding bands project. This plate serves for manually ground workpieces in order to protect the expensive bands which often use diamond grains as abrasive. For electrolytic grinding, a plate of non-conductive material is inserted, being grooved like a comb and the depth of the grooves slightly exceeding the height of metal strips as conductors for the electric current. In this case, the clamping rings are also connected to the source of the current. Fig 25 and 26 show the arrangement of cover plate 21 over grinding bands 1, 1^1, 1^4 between clamping rings 3, 4. The radial guiding slot is 22. (4 claims, 4 illustr). Ref cited : *Werkstattechnik* 1954 ; *Amer Mach* 1952.
J *Ceqm Pe.545*

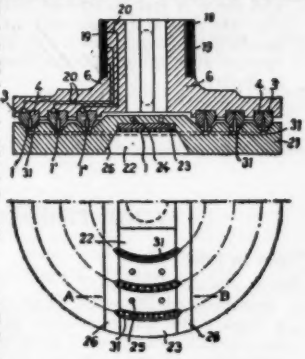


Fig 25 (above) and 26. The cover plate shown arranged over grinding bands. DAS 1,070,059.

DBP 972,889 (July 15, 1954) **K. -E. Baldauf, Nassovia Maschinenfabrik Hannes Fickert GmbH**

Spark-erosion method of drilling with stationary or rotary electrode. Funkenerosionsverfahren zur Herstellung von Bohrungen mit stillstehender oder rotierender Elektrode

The diameter of the electrode or, in case of non-cylindrical holes, the corresponding dimensions of the electrode, are smaller than those of the aperture to be produced. The smaller electrode is subjected instead to a cylindrical or conical rotation by means of two adjustable eccentrics, whose movements are combined and may be varied periodically so as to produce, *eg*, elliptical, polygonal, or other profiled perforations. (1 claim, 2 illustr). Ref cited : 1 FP ; 2 GP ; 2 DBP ; *Fertigungstechnik* 1953 and 1954 ; *Werkstattechnik u Maschinenbau* 1953. *J* *Cfbg Ptc.545*

PRODUCTION, GRADING & RECOVERY OF ABRASIVE PARTICLES

Accurate particle size distribution with electroformed sieves

R. R. Irani, C. F. Callis. *Analyt Chem* 1959 Vol 31 p 2026 ; *Brit Ceram Abstr* 1960 (5) p 206A (May)

Particle size analysis is accurately carried out by using calibrated electro-formed sieves. Distribution of particle sizes is determined in the range of 10 to 100 micron. The method is applicable for routine control laboratory technique. *X* *Vgf Wz*

Application of diamond powders. Impiego dei diamanti polverizzati

Anon. *Macchine* 1960 Vol 15 (6) p 623 (June) (In Italian)

A new method of producing diamond powders has been introduced by Diamond Tool Research Co.

M *Hv Km*

BP 826,208 **Union Carbide Corp** (July 31, 1956—conv date, USA)

Chemical process and product and abrasive articles made therefrom

Microspheres from fusible resins rounded by heat using a deglomerative first cold, then hot, turbulent gas flow process, have proved of particular value for grinding wheels. Such spheres made from, *eg* powdered resinous phenol-aldehyde condensation products, require less wetting for a satisfactory abrasive mixture. The mixture flows more readily than a standard mix and there is less danger of blister and void formation. The wheels are stronger and, as the curing cycle can be accelerated, production is speeded up. Such wheels may operate at 9,500 to 16,000 surface ft/minute. (20 claims, 4 illustr). *J* *Rd:Qc.545*

TOOL PRODUCTION

News in brief

Anon. *Industr Diam Rev* 1960 Vol 20 (235) p 118 (June)

Impregnated Diamond Products, Ltd, are to establish a department to investigate problems connected with the correct utilization of diamond tools. A comprehensive range of machines for demonstrations of drilling, grinding, trepanning, and honing with diamond tools will be provided. The Uni-Neven demonstration unit will tour European industrial centres.

Among the diamond tools made by the company are slitting disks of 4 in. diameter by 0.013 in. thick for slicing germanium and silicon. Thinner disks can be produced if needed. *D* *N Pr.21*

Use of high speed steel increased by carbide coating

Impregnated Diamond Products Ltd, Gloucester. *Machinery, Lond* 1960 Vol 97 (2491) pp 336-338 (Aug 10)

It is stated that a combination of the wear resistance of carbide with the shock resistance of HSS can be obtained by coating the edges of HSS cutting tools with carbide particles. Spark deposition of carbide can be done with Sparcard equipment, average hardness of the tool surfaces then being about 85 Rockwell C. The system is explained and advantages and disadvantages listed. In general, savings are greater with coated roughing tools than with finishing tools. While developed primarily for cutting tools, the process can also be applied to increase wear resistance of a variety of parts. Improvements in tool life of from 40 to 400% are reported. 4 illustr, 1 table.

D *Pdb Rh:Qc*

Tough cutters

Anon. *New Scientist* 1960 Vol 8 (196) p 460 (Aug 18)

Hardened alloy steels capable of supporting loads up to 145 tons/sq. in. can now be machined with tools alloyed with cobalt, tungsten and titanium carbide. Experiments at the Technical Institute for Industrial Supply, Moscow, are said to have shown that cobalt-tungsten alloys are ideal for low speed machining of very hard steels. Hardness and wear resistance of the other alloys is kept even at temperatures of 1,000° C during fast cutting. *D* *Bfd Ceq Sbdj*

Machine tools for die and mould production

H. K. Barton. *Tooling* 1960 Vol 14 (7) pp 66-69 (July)

Machine tools used in die and mould production have not recently undergone any basic modification but have been improved in detail. Nearly all large diecasting dies of any complexity are reported to be produced by Keller Automatic Toolroom machines. The Lumsden high-precision plano-type grinding machine is of particular importance to diemakers.

L *Ax Ceq Pr|Ax Chcw Pr*

Automatic machine unit for moulding abrasive sections

N. F. Frolov. *Mashinostroitel'* 1959 (10) pp 10-11 (Oct); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (2) p 566 (May) (Original in Russian)

D *Pez Qc*

Measurement and machine tools

S. W. Hugo. *Tooling* 1960 Vol 14 (8) pp 39-47 (Aug)

The three cardinal concepts in the design of machine tools and measuring machines are discussed: *ie*, the concepts of guidance, activation, and reference. 16 illustr, 3 ref. *D* *Pr Qb|Wb:Qb*

Characteristics and performance of ceramic tools

A. O. Schmidt. *Tool Engr* 1960 Vol 45 (1) p 141 (July)

Paper presented at the 24th Annual Machine Tool Electrification Forum sponsored by the Westinghouse Electric Corp, Pittsburgh, Pa.

D *Pdd Uq|Pdd Uqe*

Testing of new machine tools. Pruefen von neuen Werkzeugmaschinen

Anon. *Technik u Betrieb* 1960 Vol 12 (7) pp 125-127 (July) (In German)

Testing falls into two categories: the perfection of the finished machine itself, and the accuracy of work performed by it. The testing rules and methods are outlined. 3 illustr. *A* *Pr.1311*

Norton opens new grinding-wheel plant

Norton Co, Worcester, Mass. *Machinery, NY* 1960 Vol 66 (10) pp 190-191 (June)

A plant for the manufacture of resinoid, rubber, and shellac bonded grinding wheels has been opened as part of Norton Co's 75th anniversary celebrations. The new facilitity has improved product quality, while processing time has, in many cases, been reduced 25 to 50 per cent. Examples of tool production methods are given. 4 illustr. *D* *Pe Qc.2635*

USP 2,916,368 (July 31, 1956) **A. M. Suga, Simonds Abrasive Co**

Abrasive article

A grinding wheel having a ceramic bond and a certain hardness or softness often lacks the required mechanical strength. The new bond, comprising a fluorine-containing amphibole, permits the manufacture of wheels of various degrees of hardness with uniformly high mechanical strength. The bond is formed from a pre-fired glassy frit and the fluorine-containing amphibole selected from the group of fluoro-hornblende, fluoro-cummingtonite, fluoro-soda amphiboles and mixtures thereof whereby a material sintering at about 1,750° F is preferred. If the abrasive grain comprises diamonds, the ceramic bond preferably comprises between about 75% and 90%, by weight, of the final product. (14 claims, 1 illustr). Ref cited: 2 USP.

J *Nv:Lfd.545|Peb Cs.545*

LITERATURE REQUESTS

When applying for the loan of literature abstracted in this journal, please quote the title of the article, the name of the author, and the number of the page on which it appeared.

BP 823,229 (Feb 27, 1956) **Carborundum Co**

Abrasive cut-off wheels

Large diameter wheels can be made from sheets of a compounded rubber mix and abrasive grains rolled to the desired thickness, without using very wide rolls as hitherto required when the wheel of the desired diameter had to be died out of the sheet. It has been found that it is possible to unite two or more slabs of abrasive mix in the raw or uncured state during which the mixture has sufficient plasticity to flow under pressure. An adhesive coat may be applied between the overlapping portions. The method is explained in Fig 27 and 28. Slabs 1 and 2, formed by rolling, are placed

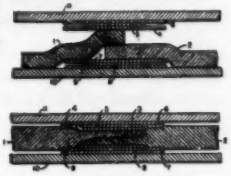


Fig 27 (top, right) and 28. Diagrams explaining two stages of the production method. BP 823,229.

between compression plates 10 and 11 with intermediate strips of spring steel, about 0.01 in. thick, 4, 5, 6 and 7, 8, 9. Pressure is then applied under a hydraulic press where the assemblage assumes the form shown in Fig 30. When the pressure is removed there may be an increase in thickness due to some 'spring-back' usual in such plastic mixes. (11 claims, 9 illustr).

J *Pef.545*

Swiss P 341,926 (Mar 27, 1958) **J. Pfau, Ateliers des Charmilles SA**

Tool for electrolytic machining and method of manufacturing this tool. Outil pour l'usinage électrolytique et procédé de fabrication de cet outil

In the electrolytic machining process, a fairly high current is caused to pass between a rotating tool and the conductive workpiece through an intermediate layer of a conductive solution. Metal removal is accompanied by the formation of a salt or an oxide which must be removed also. Therefore the tool frequently contains an abrasive, usually diamond grains which are expensive. In machining tungsten carbide, which is the most frequent application of the method, the abrasive is needed for removing the carbide particles freed by the destruction of the metallic bond. A less expensive tool for this purpose is made from a conductive piece of sintered and porous metal which, in part of the pores at least, contains solid insulating material, introduced into the metal after formation of the tool. The sintered metal wheel may consist of *eg* bronze with pores of preferably 0.1 to 1 millimetre. These pores may be filled with an insulating material containing abrasive grains of carborundum, emery, corundum. The insulating material may be a liquid to be polymerized in the tool, a powder to be heated, or it may be embedded in the tool by fusion and solidified by cooling. (8 claims, 3 illustr).

J *Ceqh Pd Qc.545*

Swiss P 342,113 (Mar 27, 1958) **J. Pfau, Ateliers des Charmilles SA**

Grinding wheel. Meule

This grinding wheel for electrolytic grinding is characterized by metal wires or strips embedded in insulating material. The metal wires in the form of, *eg*, a circular brush embedded in a hardenable synthetic resin material, serve for conducting the electric current. Such a wheel may easily be machined to a desired profile. The wheel may also contain abrasive material either throughout or in its outer layer. Instead of wires or strips, chips or cuttings from lathes or drills may be incorporated. Because abrasive grains are present, the wheel may also be used for ordinary grinding. (10 claims, 6 illustr). *J* *Chcr Pe.545*

FP 1,195,196 (May 2, 1958) **M. Ferrand**

Abrasive tool and its method of manufacture. Outil abrasif et son procédé de fabrication

The tool is intended for the maintenance of electric contact faces. A thin layer of diamond grains electrolytically embedded in a metal bond in the shape of a thin plate is attached to a strip of plastic material at the end of a handle manufactured in large series. The electrically non-conductive handle permits the use of the tool for cleaning contact faces without switching off the current. (6 claims, 4 illustr).

J *Pe Qc.545*

FP 1,197,184 (May 29, 1958) **M. Sedlacek, née A. Herzig**

Method of manufacturing cutting and polishing tools. Procédé de fabrication d'outils de coupe et de polissage

Thin relatively resistant disks, balls, or strips are made from a zinc-alloy support to which polishing grains, preferably diamond grains, are fixed in an electrolytic bath; the grains form the cathode, the anode being copper and zinc. The temperature of the bath is 60 to 70° centigrade. (7 claims).

J *Ceg Pd Qc.545/Chm Pe Qc.545*

FP 1,201,084 (Aug 1, 1958) **Abrasive & Metal Products Co**

Abrasive articles. Articles abrasifs

A grinding wheel bonding material of a phenolaldehyde resin contains as an additive a condensation product of ethylene oxide, and a hydrophobic base formed by condensation of propylene oxide with propylene glycol, its molecular weight being between 2,000 and 7,500 approximately. The percentage of abrasive, diamond, carbides, fused alumina, *etc*, may be 50 to 64% by volume with 12 to 30% bonding resin. The additive should be 0.8 to 15%; a filler, such as cryolite, iron oxide, feldspar, Kaolin, may form up to 50% of the mixture; and 1 to 10% of the bond may be chalk. (7 claims). *J* *Rd.545*

POWDER METALLURGY

Vascoloy-Ramet cemented [sintered] titanium carbide

Vascoloy-Ramet, Waukegan, Ill. *Machinery, NY* 1960 Vol 66 (11) pp 230-231 (July)

VR-65 is the first of a series of new cutting tool materials manufactured by the company. This grade is intended to extend the range of conventional sintered carbides since it operates at speed and feed ranges between those of present carbide grades and ceramic materials. VR-65 is made by powder metallurgy with other metallic carbides used as alloying ingredients with the sintered titanium carbide. Normal hardness is in the range of the harder carbides and strength is appreciably higher than that of ceramic materials. Freedom from porosity and fine grain structure are claimed, as are excellent crater resistance and freedom from 'build-up' while machining steel. Fine surface finish is also claimed. 1 illustr.

D *Rhd*

Metal-ceramic mixtures

P. Murrey. *Powder Metall* 1960 (5) p 64; *Brit Ceram Abstr* 1960 (6) p 243a (June) No 1714

The present position regarding cermets based on either oxides or carbides as the brittle phase is reviewed. 2 illustr, 4 tables. *D* *Rg Rpz/Rm Rpz*

The use of sintered materials

R. O. Windley. *Mach Lloyd* 1960 Vol 32 (15A) pp 29-31 (July 23) (In English, abstrs in French & German)

The development of tools with tips made from sintered carbides provides for higher cutting speeds and longer tool life than the high speed steels previously used. A description of sintering, using a suitable metal powder, is given. A section deals with the application of porous materials to bearings. The fabrication of tungsten wire and filaments is explained; diamond dies are used, with gradually reducing temperatures to obtain the very fine wire used for lamp filament. 2 illustr, 2 ref.

L *An Bfp Cn Nk/Bk Qt*

Tungsten carbide

A. S. Hester, A. D. Mitchell, R. W. Rees (editors). *Industr Engng Chem* 1960 Vol 52 pp 94-100 (Feb); *Battelle Tech Rev—Abstr* 1960 Vol 9 (5) p 309a No 5961

Includes sections on powder metallurgy and tool manufacture.

D *A Bkcb Qc.52/Bkcb Qt.52*

Swiss P 341,998 **G. W. Lucas, C. S. Wiedman, General Electric Co**

(May 13, 1955—conv date, USA)

Hard metal alloy. Hartmetallegierung

A sintered hard metal alloy for cutting purposes made from tungsten carbide crystals, at least one additional carbide, and at least one auxiliary metal, is characterized by tungsten carbide crystals of a size not exceeding 25 to 250 microns. A specially mentioned alloy contains 60 to 90%, weight, tungsten carbide crystals, 5 to 30%, weight, additional carbide, and 1.5 to 10%, weight, auxiliary metal. (12 claims, 4 illustr).

J *Bk Qc Qx.545*

FP 1,201,138 **G. T. Sermon, T. J. Lescelins, United Carbon Products**

(Aug 5, 1957—conv date, USA)

Abrasive tools, method of their manufacture and their applications. Outils abrasifs, leur procédé de fabrication et leurs utilisations

A carbon bonded honing tool of good heat conductivity can be used for thin workpieces without danger of overheating, is self-lubricating, suitable for automatic operations, for metallic and non-metallic workpieces, and can be used at higher speeds than usual. It comprises a carbonizable material, *eg* graphite and carbon (coal tar), which is mixed as a powder with the abrasive (silicon carbide, fused alumina). The mixture is moulded under pressure, heated slowly in an inert atmosphere to 1,200° centigrade. When using boron carbide and titanium hydride, 40 parts, in equal amounts with a carbon graphite mixture, 60 parts, the temperature will be raised to 2,200° centigrade. (22 claims, 5 illustr).

J *Pe Qc.545/Pe.1451.545*

MISCELLANEOUS

Olympia in close-up—1

Anon. *Machinery, Lond* 1960 Vol 97 (2488) pp 158-163 (July 20)

Some set-ups, features of design, and items of equipment observed at the recent International Machine Tool Exhibition are photographed with explanations. 18 illustr. *D* *Pr.27*

Carbide Engineering, Annual Diamond Issue, 1960

Carbide Egnng 1960 Vol 12 (6) 68 pp (June)

The principal articles are: Design, use and care of diamond cutting tools, by J. Taeyaerts; Taking some of the mystery out of carbide tool grinding, by R. A. Parke; Surface grinding carbide — man-made and natural diamonds, by N. L. Leventhal; and, Super precision and finish with diamond, by J. H. Olson. Abstracts of these articles appear in appropriate sections of *Industrial Diamond Abstracts*. Regular features of *Carbide Engineering* are retained, while a useful directory of diamond products for those who work sintered carbides is provided.

D *Bk Chcm Nv/Bk Chcm Nvh/Nf*

Campaign to publicise industrial diamond and its uses

Anon. *Diamond News* 1960 Vol 23 (10) p 9 (July)

Refers to a campaign to cover the UK and Europe, reported by a De Beers spokesman in an interview with *Diamond News*. *D* *Fc.222*

The late Romi Goldmuntz

P. J. Oppenheimer. *Diamant* 1960 Vol 4 (21-22) pp 6-7 (May-June) (In English and Flemish)

A personal tribute to Romi Goldmuntz and his achievements in the Belgian diamond industry.

K *F.25.292*

The second congress of the World Federation of Diamond Bourses

V. Barsamian. *Diamant* 1960 Vol 4 (21-22) pp 24-25 (May-June) (In English)

K *F.251.31*

Mineral processing supplement

Anon. *Min J* (Suppl) 1960 Vol 254 (6501) (Mar 25) 32 pp, illustr

Proceedings of the International Mineral Processing Congress are abstracted and include sections on gravity and dense media separation, and magnetic and electrical separation. *D* *Bc Cc.1456*

Forecasting machining rates for 1970

Anon. *Engineering, Lond* 1960 Vol 189 (4912) pp 790-791 (June 10)

An examination of the variables, *eg* material strength, cutting speeds, tool geometry, cutting fluids, which control the removal of stock by machining, shows that techniques have improved with a marked increase of rate since 1900. There is no sign of levelling off. 10 illustr. *A* *Ceq.132*

Progress in automation. Vol 1

A. D. Booth (editor). *New Scientist* 1960 Vol 8 (196) p 477 (Aug 18)

Book, Butterworths Scientific Publications, 321 pp. Price 42s

Articles by ten leading technologists follow an introduction by the editor. The various topics include the development of automatic machine tools.

[Not in library of Industrial Diamond Information Bureau]. *D* *Prs.132*

Machine tools and the user

Anon. *Machinery, Lond* 1960 Vol 97 (2487) pp 121-124 (July 13)

An informal discussion on this subject, organized by the Institution of Mechanical Engineers, was held concurrently with the International Machine Tool Exhibition at Olympia. The various papers and opinions expressed are summarized.

D *Pr*

Factored machine tools exhibited by Burton Griffiths & Co Ltd

Anon. *BSA Tools Div J* (Suppl) 1960 Vol 4 (4) 14 pp (June)

Describes machine tools shown at Olympia which were the products of various companies, British and foreign, represented in this country by Burton Griffiths & Co Ltd. *D* *Pr.27*

Machine tool trends in Hungary

Anon. *Mach Lloyd* 1960 Vol 32 (15) pp 38-39 (July 16) (In English, abstr in French and Spanish)

Describes some of the technical aspects of exhibits at the 1960 Leipzig Fair. 4 illustr.
D *Pr.27.329*

Tool industry specialization in the U.S.A., England and Western Germany

Z. G. Magaziner. *Machines & Tooling* 1960 Vol 31 (3) pp 35-37 (Mar)

7 illustr, 8 ref.
D *P.25.321/P.25.322/P.25.342*

The Basle Industry Fair 1960

Anon. *Industr Diam Rev* 1960 Vol 20 (235) p 119 (June)

Reviews the Fair in general with special reference to exhibits of interest to users of industrial diamonds. The products mentioned, and many others shown, are covered in appropriate sections of various issues of *Industrial Diamond Abstracts.*
D *Fc.27*

Machine tool trends

Anon. *Mach Lloyd* 1960 Vol 32 (15A) pp 23-24 (July 23)

A survey, based on the International Machine Tool Exhibition 1960, of the developments in machine tool construction and practice since the European Exhibition staged in Paris in September 1959.
A *Pr.132.27*

The machine tool industry of Japan

R. E. Green. *Machinery, Lond* 1960 Vol 97 (2487) pp 108-118 (July 13)

8 illustr, 3 tables. *D* *Pr.25.373*

PUBLICATIONS RECEIVED

BOOK REVIEWS

The National Physical Laboratory [:] Report for 1959

D.S.I.R., HMSO, London. 1960, 140 pp, illustr. Price 8s

Lists of members are followed by the Report of the Executive Committee and summaries of work done in 1959 in the various divisions. In the Basic Physics Div, research into ultrasonics included the development of an ultrasonic reflection goniometer, which has been used to investigate texture, orientation of single crystals, hardness and its variation with depth, and the depth of cold work. Diffraction gratings were studied by the Gratings Section of the Light Div, the three main objects being to improve the supply of both spectroscopic and metrological gratings, to develop new ways of using them, and to foster their application by science and industry. The Metallurgy Div report includes work on electron microscopy and study of high temperature materials, while in the Standards Div work was done on pneumatic gauging instruments and techniques and hardness measurement, among other subjects.

The results of experimental work using the new deadweight standard machine for measuring hardness in the diamond pyramid scale and an experimental deadweight Rockwell machine have been published [see *Industr Diam Abstr* 1959 Vol 16 p A205 (Nov)]. Another important point was the establishment of the technique of producing uniformly hard test blocks in the range 950 to 200 of the Vickers scale [see *Industr Diam Abstr* 1959 Vol 16 p A230 (Dec)]. Construction of a new deadweight standard hardness testing machine for the Rockwell B and C scales has begun. In anticipation of the need to investigate properties of the diamond indenters to be used in the Rockwell standard machine, multiple-beam interferometric and phase contrast techniques for examining the surfaces of diamond were studied, and these techniques revealed cracks and flaws in diamond indenters which had hitherto been unsuspected and which may prove to affect the hardness values obtained.
D *Cvd Nde Pr/Cvd Pr.52:Ndf U.21/ Vwg.264.52:.2232.52*

Structural elements for precision mechanics. Bauelemente der Feinmechanik

F. Kozer. VEB Verlag Technik, Berlin. 1959, 8th Ed, 5[c]1 pp, illustr. (In German)

The first edition of this standard German work, designed to give a comprehensive survey of the whole field of elements and mechanisms for precision mechanics, appeared thirty years ago. The eighth edition is considerably different from the earlier ones. The subject matter has been completely reorganized into nine main sections and additional material has been included in order to meet the needs of the rising generation of technologists.
K *Ceqz.52*

A new basis for an inspection method for sintered metal components

B. Bovarnick. *US Department of Commerce, Office of Technical Services* PB 151133, 92 pp. Price $2.25

A basic engineering investigation was undertaken to establish the requirements of a non-destructive test as a 100% inspection method for in-process quality control and acceptance testing of sintered metal parts. The report is divided into five parts, the second being an historical review of powder metallurgy techniques. 17 illustr, 94 ref, 7 tables.
D *Bkc Cy/Qt.28*

TRADE LITERATURE

The story of a diamond in pictures

J. Aardewerk (Diamonds) Ltd, Audrey Hse, Ely Place, London EC 1. 28 pp, 9¼ × 8 in., illustr; *Industr Diam Rev* 1960 Vol 20 (235) p 117 (June)

An illustrated booklet, issued by the firm on its 20th anniversary, shows in a photographic series the story of a diamond, starting at the Kimberley Mine. A page of diagrams shows the various types and cuts of diamond, with views from the top, the side, and below.
D *F.25.57*

Control the finish and you control the costs

Brush Instruments, Div of Clevite Corp, Cleveland 14, Ohio. 12 pp, 11 × 8½ in., illustr.

The Surfindicator is claimed to be a reliable precision production tool. It has a hand-operated pick-up conical diamond stylus, 0.0005 in. tip radius, which detects surface variations and transmits them to a meter dial. Adapters are available for extending the range of applications to hole bottoms, unusually rough finishes, small bores, and other special situations.

Exclusive precision reference specimens are supplied and it is said that the Surfindicator can measure any finish produced by any process. Case histories are quoted, and accessories are described.

D *Chmz Nfs Wp*

Diamond wheels, saws, and hones [:] Catalog and price list No 65

J. K. Smit & Sons Inc, Murray Hill, NJ. 24 pp, 11 × 8½ in., illustr

Specifications for the company's range of wheels, saws, and hones, and ten rules for the care and maintenance of diamond wheels are given. A list of other products manufactured is included.

D *Ng.254/Nqe.254/Nv.254*

New from Truco

Truco Masonary Drilling, Div of Wheel Trueing Tool Co, Detroit 38, Mich. 8 pp, 11 × 8½ in., illustr

Details of the company's latest masonary drilling and sawing equipment, including diamond drilling machines and diamond impregnated bits.

D *Nhb Pr/Nqg Pr*

PATENT LISTS

BRITISH

The Official Journal (Patents) 1960 (3729) (Aug 4)

849,638 BROOKES (OLDBURY) LTD. Grinding machines.

850,049 CINCINNATI MILLING MACHINE CO. Precision-grinding machine.

849,391 LIBBEY-OWENS-FORD GLASS CO. Method and apparatus for edge treating.

849,766 STRANCK, H. J. Grinding machines, particularly for grinding spectacle lenses.

The Official Journal (Patents) 1960 (3730) (Aug 10)

850,284 AGIE AKTIENGESELLSCHAFT FUER INDUSTRIELLE ELEKTRONIK. Methods of detaching material by electroerosion.

850,548 ZAHNRADFABRIK FRIEDRICHSHAVEN AG. Apparatus for the convex grinding of gear wheels.

850,203 LANDIS TOOL CO. Grinding machines.

The Official Journal (Patents) 1960 (3731) (Aug 17)

851,309 INDUSTRIAL DISTRIBUTORS (1946) Ltd. Eroding of diamond.

851,105 LINDNER GmbH, H. Forming devices for profile grinding disks.

UNITED STATES

Official Gazette 1960 Vol 756 (1-4) (July)

2,943,393 T. A. INSOLIO, AMERICAN WINDOW GLASS CO. Glass cutter trolley unit.

2,943,425 H. E. BALSIGER, LANDIS TOOL CO. Feed correction mechanism.

2,943,926 G. J. GOEPFERT, CINCINNATI MILLING MACHINE CO. Abrasive wheel composition.

2,944,027 J. M. STANLEY, S. THEOKRITOFF, E. A. GERBER, A. R. CHI, D. L. HAMMOND, UNITED STATES OF AMERICA. Method of fabricating a synthetic quartz crystal.

2,944,172 W. OPITZ, H. SPRUCK, K. H. STEIGERWALD, C. ZEISS. Apparatus for working materials by means of a beam of charged particles.

2,944,373 M. B. MENTLEY, Z. KOKORZYCKI, D. W. DANIEL, NATIONAL BROACH & MACHINE CO. Grinder with compensating trimming mechanism.

2,944,880 L. R. ALLEN, D. H. WOODLAND, KENMORE RESEARCH CO. Lapping compound.

2,945,331 L. J. LA BARRE, WILLIAM I. GIRDNER, HEWLETT-PACKARD CO. Lapping machine.

2,945,936 E. H. CARMAN, BIRMINGHAM SMALL ARMS CO LTD. Spark-machining.

2,946,161 K. H. SCHULTZE, O. JAECKEL, HERBERT LINDNER GmbH. Feed device for thread grinding machines.

2,946,162 S. S. MADER, J. W. JOHNSON, NORTON CO. Multiple wheel grinding machine.

2,946,731 J. J. FALLS, STANDARD ELECTRICAL TOOL CO. Method and apparatus for electrolytic shaping.

SOUTH AFRICAN

Official Journal 1960 Vol 13 (26-29) (June-July)

59/5056 G. L. HAYWOOD, NORTON CO. Abrasive product.

60/466 C. V. DOENHOFF, CARBORUNDUM CO. Abrasive article.

60/524 J. F. HUTTER, L. KELLY, G. R. MOUNCE, E. W. LEAVER, K & H EQUIPMENT LTD. Materials sorting apparatus.

60/538 H. C. MILLER, SUPER-CUT INC. Abrasive diamond core drill.

AUSTRALIAN

Official Journal 1960 Vol 30 (20-23) (June)

228,227 SKIL CORP. Abrasive cutting tools.

SWISS

Patentliste 1960 (12-13) (June-July)

347,409 C. EISELE, A. EISELE, CHR EISELE KG MASCHINENFABRIK. Circular metal saw.

347,411 S. G. BRADY, EX-CELL-O CORP. Machine for truing a grinding wheel.

347,586 J. PFAU, ATELIERS DES CHARMILLES SA. Method of machining a matrix by electro-erosion and machine for carrying out this method.

347,725 E. FOUQUET. Grinding device.

347,727 K. STOLL, KURT STOLL KG. Vibration grinder.

347,777 A. P. GLENNY, SPERRY GYROSCOPE CO LTD. Assembly formed by a part of a rotary member, a pivot and a shock-absorbing ball bearing.

FRENCH

Bulletin Officiel 1960 Vol 1 (27-31) (July-Aug)

1,236,031 SOC INDUSTRIELLE ET COMMERCIALE DES OUVRIERS LUNETIERS COTTET, POICHET, TAGNON & CIE. Apparatus for machining, in particular spheroidal or toroidal surfaces.

1,236,462 ATELIERS DES CHARMILLES SA. Method of electrical machining.

1,236,040 SOCARL SOCIETE CMV. Machine for working plane surfaces.

1,236,249 MOELLERIT INTERNATIONAL-HOLDING ETS. Emery wheel.

1,237,085 C. H. MOTZ, NATIONAL BROACH AND MACHINE CO. Method and machine for grinding gear wheels.

1,236,608 M. BRUMA, CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE. Device for machining by intermittent electric discharges.

1,236,783 SOC D'ETUDES ET DE FINANCEMENTS INDUSTRIELS. Apparatus for the automatic diamond truing of a profiled grinding wheel.

1,236,810 J. DIONISOTTI. Rock drilling tool.

1,237,153 D. HOFMANN. Device for balancing rotary tools subject to wear.

1,237,613 H. SCHIERHOLT, DEUTSCHE EDELSTAHLWERKE AG, ALLGEMEINE ELEKTRICITAETSGESELLSCHAFT. Device for controlling the feed of electrodes used on machines for spark-erosion.

1,237,614 R. SATTLER, H. SCHIERHOLT, H. J. SCHULZ, DEUTSCHE EDELSTAHLWERKE AG, ALLGEMEINE ELEKTRICITAETSGESELLSCHAFT. Method and device for flooding the space between electrode and workpiece during machining of workpieces on machines for spark-erosion.

1,238,428 ETS BOHIN. Device for presentation and packaging of articles such as sapphires or diamonds for pick-ups.

1,237,978 J. A. LAVALLE, LAVALLE & IDE, INC. Production of drills.

1,238,190 H. J. SCHULZ, H. SCHIERHOLT, DEUTSCHE EDELSTAHLWERKE AG, ALLGEMEINE ELEKTRICITAETSGESELLSCHAFT. Pulse generator for machines working by spark-erosion.

1,237,932 SA DES USINES CHAUSSON. Manufacture of abrasive articles and products obtained by this method.

1,238,517 T. H. SLOAN. Machine for grinding the races for anti-friction bearings and similar articles.

GERMAN

Patentblatt 1960 Vol 80 (30-33) (July-Aug)

Applications Open to Public Inspection

1,086,111 L. O. CARLSEN, W. C. CRITCHLEY, H. PEDERSEN, GLEASON WORKS. Grinding machine for toothed machine elements with a truing device for a conical grinding wheel.

1,086,362 E. E. TEUBNER, E. M. WILLIAMS, FIRTH STERLING INC. Metal working machine for removing metallic material by electro-spark erosion.

1,086,581 W. DARBY, STUART DAVIS LTD. Device for forming and truing grinding wheels.

1,086,582 GESELLSCHAFT DER LUDW VON ROLL'SCHEN EISENWERKE AG. Truing device for a grinding wheel of a surface grinding machine, in particular of a machine for grinding slide-ways.

1,087,040 PILKINGTON BROTHERS LTD. Lower grinding head of a glass grinding machine for the simultaneous grinding of both sides of a travelling ribbon of glass.

1,087,041 K. HOTZ, SIEMENS-SCHUCKERTWERKE AG. Apparatus with a rotary tool for machining rotating bodies with profiled surfaces.

1,087,073 A. MATTSON, A. V. KARLSSON, J. NILSSON, SKANDINAVISKA GRANIT AB. Stone saw.

1,087,326 H. SICKEL. Method of mechanically severing a part from a rod-shaped or tubular workpiece of glass or the like.

Patent Granted

974,077 SCHMIDT & SCHAUDT KG. Grinding machine controlled by a measuring device.

IDR REPRINT SERVICE

The following reprints are now available from Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1, at a charge of 1s each, post free :

C 99—Diamond. Part 1, by S. Tolansky (*Contemporary Physics* 1959).
C 100—Diamond. Part 2, by S. Tolansky (*Contemporary Physics* 1960).
I 254—Test blocks for indentation hardness testing, by J. G. Wood (*IDR* 1959).
I 255—The practical realization of the HV and HR scales, by R. S. Marriner (*IDR* 1959).
I 256—A film for recording the reactions in the diamond wheel structure, by K. E. Schwartz (*IDR* 1959).
I 257—The grinding technique and its importance for the proper use of carbides in the wood-working industry, by T. Englesson (*IDR* 1959).

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LIST OF PUBLICATIONS, OCTOBER, 1960

***INDUSTRIAL DIAMOND ABSTRACTS:** Issued monthly, from 1944 onwards, about 20 pp, 7¾ x 9¾ in. Surveys technical, scientific, and patent literature.

***LIST OF PERIODICALS—BIBLIOGRAPHY OF INDUSTRIAL DIAMOND APPLICATIONS:** Alphabetical, 8 pp, 7¾ x 9¾ in., Sep 1955.

***LIST OF PERIODICALS IN THE INDUSTRIAL DIAMOND INFORMATION BUREAU LIBRARY AT MAY 31, 1958:** Alphabetical, 8 pp, 7¾ x 9¼ in. A list of periodicals available for loan from the Industrial Diamond Information Bureau Library. This does not replace *List of Periodicals* (above), which is a list of periodicals abstracted in *Industrial Diamond Abstracts*, many of which are not held by the Library.

***IDR REPRINT SERVICE :** Classified, authors' index, subject index of groups, 12 pp, 7¾ x 9¾ in., Sep 1958. (Reprints 1s each, post free).

***THE DIAMOND RESEARCH LABORATORY:** 16 pp, illustr, 11 x 9 in. Rev ed, 1956.

SELECTED BIBLIOGRAPHIES:

* **Truing of grinding wheels** (from 1910 to 1951). 39 pp, 7¾ x 9¾ in. 3rd rev ed, Feb 1952.

* **Diamond as cutting tool for metals and non-metallic materials.** 24 pp, 7¾ x 9¾ in. 2nd rev ed, Nov 1950. Name index, 1951.

Hardness and hardness testing (from 1937 to 1955). 118 pp, name index, subject index, 7¾ x 9¾ in. 1955-56. Price 5s 6d.

DIAMOND TOOL PATENTS (Patent Monographs)

IA: Machining metals and non-metallic substances, by P. Grodzinski, W. Jacobsohn. 2nd rev ed, 55 pp, 7¾ x 9¾ in. Apr 1949. Price 10s.

II, IIs: Diamond abrasive wheels, by P. Grodzinski. 74 pp, 4 tables, name index, 7¾ x 9¾ in. Aug 1948/49. Price 13s 6d.

III, IIIs: Truing of grinding wheels, by W. Jacobsohn. 133 pp, 82 illustr, name index, 7¾ x 9¾ in. Dec 1948/49. Price £1.

IV: Polishing of gem diamonds, by W. Jacobsohn. 40 pp, 83 illustr, 1 table, name index, 7¾ x 9¾ in. December, 1950. Price 12s 6d.

IA to IIIs available as compilation in Spirollo binding, price £2 9s.

THE PRINCIPLES AND DESIGN OF A NUCLEAR RADIATION COUNTER WHICH USES A DIAMOND AS ITS DETECTOR, by W. F. Cotty. 18 pp, illustr, 7¾ x 9¾ in. Oct 1956. Price 2s 6d.

DATA SHEETS FOR THE DIAMOND TOOL DESIGNER AND MAKER—Definition and designation of angles: Comparison of names for tool angles: Plane of chip flow: Clearance and rake angles: Minimum clearance for diamond boring tools: Economic layout of tool tips: Height position of turning tools: Accepted standards. 1945, reprinted Oct 1956. Price 5s

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* *Publication free of charge.*

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